

Chapter Three

Biological Resources

A. Carmel Mountain Preserve

The biological resources on Carmel Mountain Preserve have been studied extensively for development projects and for science. The results of the studies and surveys have been compiled and are presented in this chapter.

1. Location

Carmel Mountain Preserve is situated south of Highway 56 and east of Interstate 5, between Carmel Creek and Carmel Country Roads. This area includes Carmel Mountain and facilitates an important wildlife corridor adjoining it to Peñasquitos Canyon, and to the Los Peñasquitos Lagoon. Given the region is in such a unique location, it provides for an important inland-coastal habitat linkage.

2. Historical Land Use

Carmel Mountain Preserve has been historically perceived as public open space, providing for a variety of recreational activities such as hiking, mountain biking, and horseback riding. The region is surrounded by a number of development projects, primarily suburban, housing development.

3. Topography and Soils

a. Topography

The general topography of the site (Figure 3-1) can be described as generally level coastal terraces which are slightly westward tilting, with a marine material overlaying the surface. The central portion of the Preserve is a fairly level mesa, varying from 380 to 430 feet above sea level. Several small drainages dissect the margins of the mesas.

b. Soils

Soils mapped for the area (Figure 3-2) by the U.S. Department of Agriculture (1973) are as follows:

Carlsbad Series (Carlsbad gravelly loamy sand, 5 to 9 percent slopes)

This series consists of moderately well-drained to well-drained gravelly loamy sands which are moderately deep over a hardpan. Vegetation typically associated with this series, includes chamise, black sage, laurel sumac, annual forbs, and grasses. The surface layer is typically 21 inches thick.

Carlsbad gravelly loamy sand (5 to 9 percent slopes) occurs on the project site in the south-central to mid-central portions of the project site. This soil type had moderately good drainage, with permeability moderately rapid above the hardpan and very slow in the pan. Water-holding

capacity is between 4.0 and 4.5 inches. Runoff is slow to medium, and erosion hazard is slight to moderate.

Corralitos Series (Corralitos loamy sand 5 to 9 percent slopes, 9 to 15 percent slopes)

The Corralitos series consists of a somewhat extensively drained, very deep loamy sand formed in alluvium and derived from marine sandstone. These soils are typically found in narrow valleys and on small alluvial fans. Vegetation is typically red brome, ripgut brome, California buckwheat, and shrubs. Corralitos loamy sand (5 to 9 percent slopes) occurs on the project site, in a small patch on the northeast corner. This is a moderately sloping soil. Runoff is slow to medium, and the erosion hazard is slight. This soil type is similar to Corralitos loamy sand, 9 to 15 percent slopes.

Corralitos loamy sand (9 to 15 percent slopes) is a strongly sloping soil that occurs in narrow valleys; slopes are somewhat concave and average 12 percent. Permeability is rapid and fertility is medium. Water-holding capacity ranges from 3.7 to 5 inches, with medium runoff and moderate erosion hazard.

Gaviota Series (Gaviota fine sandy loam, 30 to 50 percent slopes)

The Gaviota series is marked by well-drained, shallow fine sandy loams that formed in material weathered from marine sandstone. These soils are on uplands and have slopes of 9 to 50 percent. Vegetation is primarily chamise, cactus, scrub oak, laurel sumac, California buckwheat, annual grasses, and forbs.

Gaviota fine sandy loam (30 to 50 percent slopes) occurs on the southeastern side of the project site. This is a steep soil around 9 to 18 inches deep over the underlying hardpan. Runoff is rapid, with a high erosion hazard.

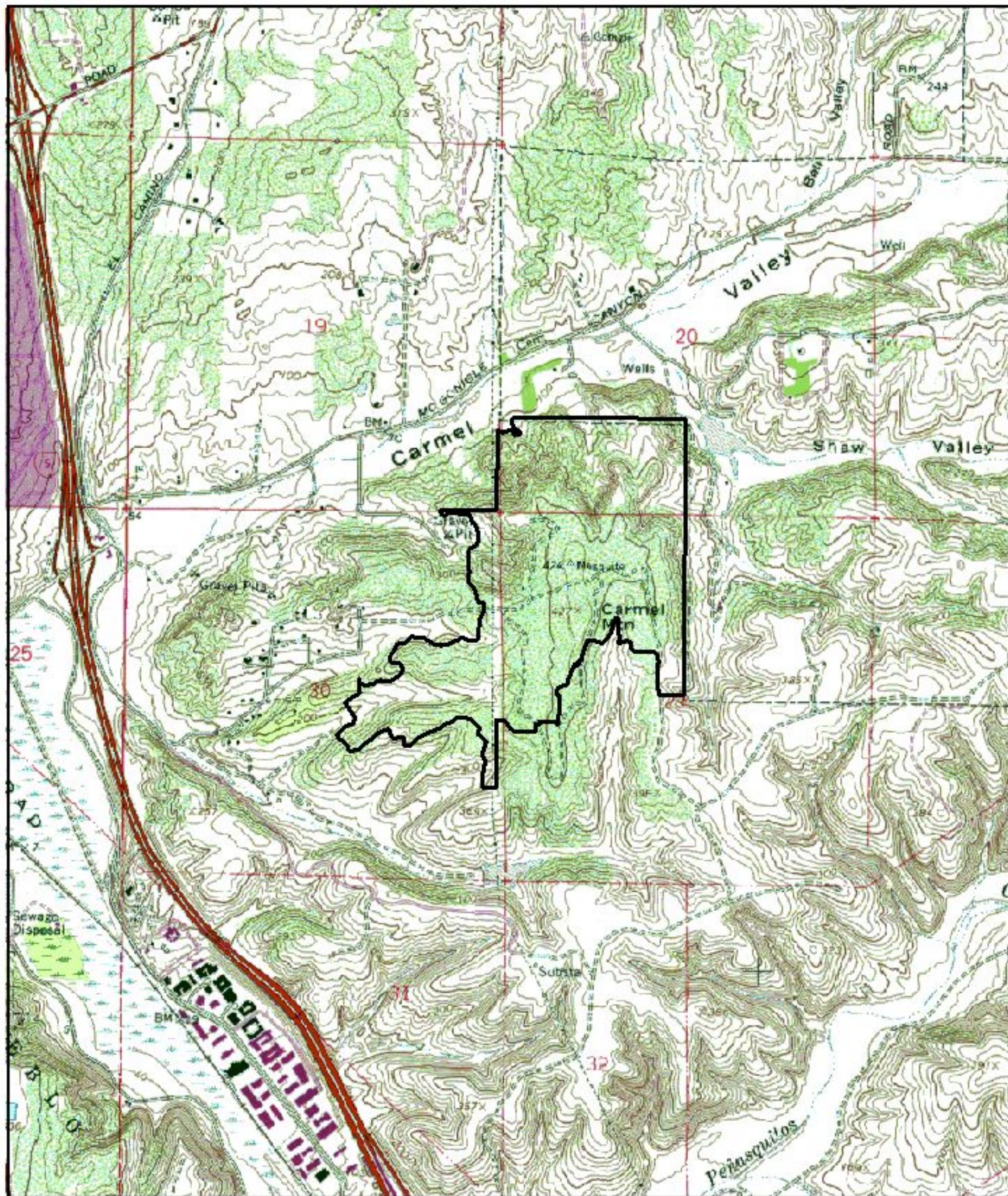
Huerhuero Series (Huerhuero loam 15 to 30 percent slopes, eroded)

This series consists of moderately well-drained loams with clay subsoils, formed in

marine sediments. Slopes range from 2 to 30 percent; the ground surface is typically Huerhuero loam

Loamy alluvial land-Huerhuero complex (9 to 50 percent slopes, severely eroded)

Loamy alluvial sand consists of somewhat poorly drained, very deep, dark brown to black silt loams and sandy loams. This type of sand is usually found on old coastal ridges, ranging from strong sloping to steep, severely eroded soils and alluvial fill along drainageways. The elevation ranges from sea level to roughly 500 feet. Huerhuero and



Map Source: USGS 7.5 minute topographic map series,
Del Mar quadrangle

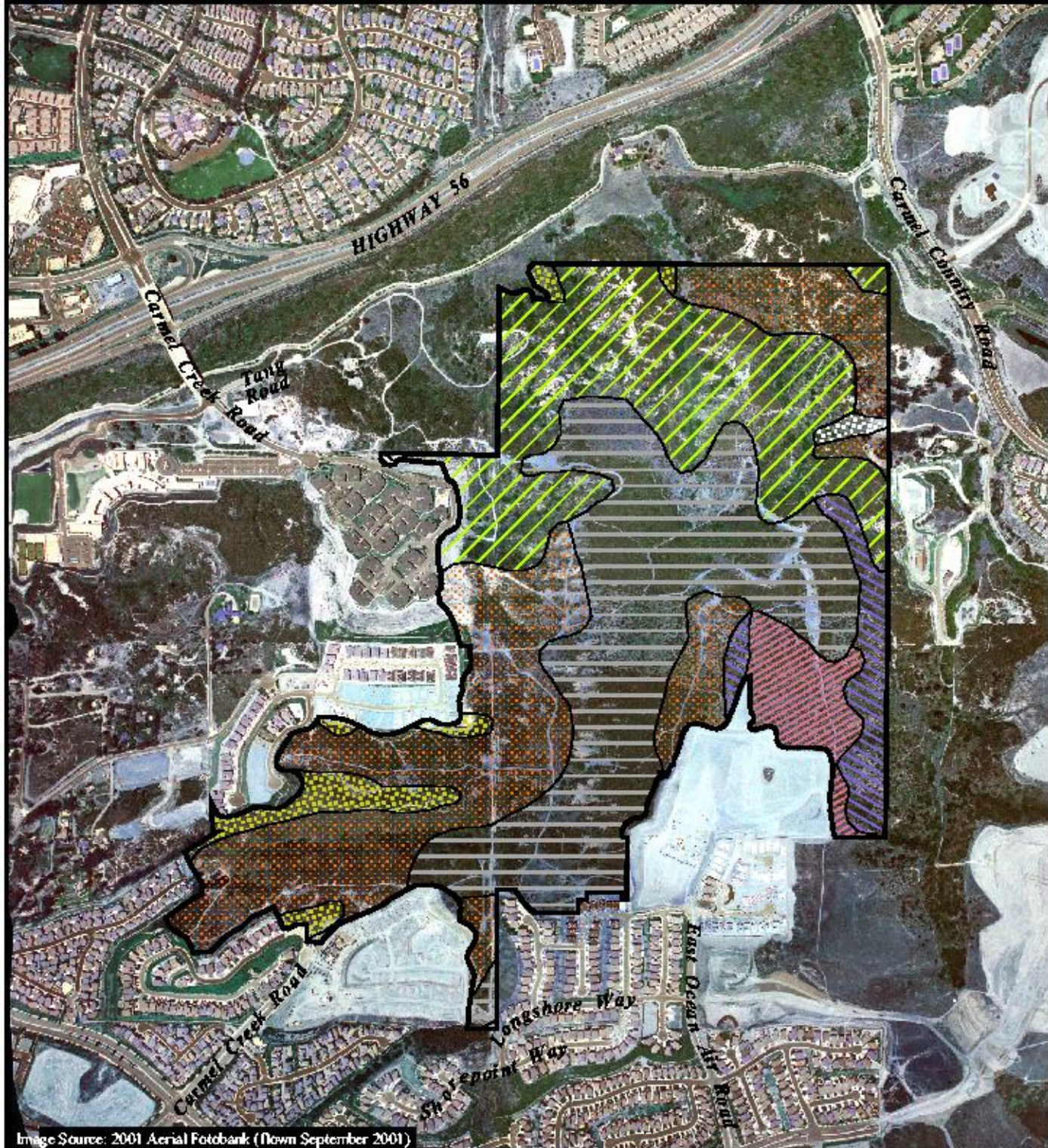


Carmel Mountain Preserve



1:24,000
0 Feet 2000

FIGURE 3-1
Topography of
Carmel Mountain Preserve



Carmel
Mountain
Preserve

Soil Types








-  Carlsbad gravelly loamy sand, 5 to 9 percent slopes
-  Corralitos loamy sand, 5 to 9 percent slopes
-  Corralitos loamy sand, 9 to 15 percent slopes
-  Gaviota fine sandy loam, 30 to 50 percent slopes
-  Loamy alluvial land-Huerfuerro complex, 9 to 50 percent slopes, severely eroded
-  Redding gravelly loam, 2 to 9 percent slopes
-  Terrace escarpments

FIGURE 3-2

**Soils on
Carmel Mountain Preserve**

Carlsbad soils are generally severely eroded. Sparse coastal chaparral grows on these soils.

Redding Series (Redding gravelly loam, 2 to 9 percent slopes)

The Redding series consists of well-drained, undulating to steep gravelly loams that have a gravelly clay subsoil and a hardpan. These soils formed in old mixed cobbly and gravelly alluvium. Vegetation typically associated with this series includes chamise, California buckwheat, laurel sumac, scrub oak, and annual forbs and grasses. The surface layer is typically yellowish-brown and light-brown, with medium and strongly acidic gravelly loam about 15 inches thick. The subsoil is yellowish-red and red, of very strong acid gravelly clay loam and gravelly clay.

The Redding gravelly loam, is an undulating to gently rolling soil, with an average slope of 3 percent. The topography consists of low, broad mounds, which are locally known as mimamounds.

Terrace Escarpments

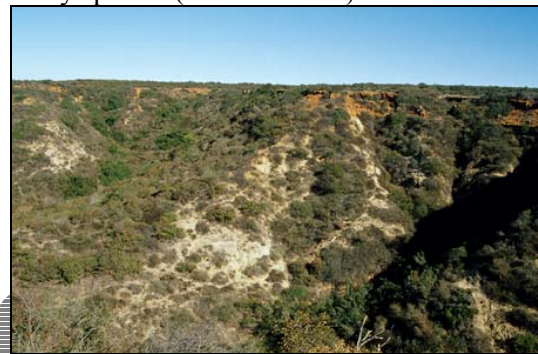
Terrace escarpments consist of steep to very steep escarpments and escarpment-like landscapes, which occur on nearly even fronts of terraces or alluvial fans. In most places there are 4 to 10 inches of loamy or gravelly soil over soft marine sandstone, shale, or gravelly sediments. Vegetation may consist of sparse cover of brush and annual forbs and grasses on south-facing slopes while fairly dense cover may reside on north-facing slopes.

4. Vegetation Communities

Four vegetation communities as classified by Holland (1986) are present within the area: southern maritime chaparral, Diegan coastal sage scrub, and mesic meadow (Figure 3-3). Roads, cleared areas, sand extraction pits, and other disturbed areas which total 21.7 acres are mapped as disturbed. A list of observed plant species is shown in Appendix 3a.

a. Southern Maritime Chaparral

Southern maritime chaparral dominates most of the site occupying 247.8 acres. This is a low, fairly open plant community, typically dominated by wart-stemmed ceanothus (*Ceanothus* (*Ceanothus verrucosus*) and Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*). This community occurs on weathered sands in the coastal fog belt and appears to depend on fire for reproduction of many species (Holland 1986).



Photograph 3-1: Southern Maritime Chaparral on the Terrace Slopes of Carmel Mountain

Dominant shrubs on-site include chamise (*Adenostoma fasciculatum*), lemonadeberry (*Rhus integrifolia*), mission manzanita (*Xylococcus bicolor*), and Nuttall's scrub oak (*Quercus dumosa*). Characteristic southern mixed chaparral indicator plant species, including Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*), wart-stemmed ceanothus, summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*), sea dahlia (*Coreopsis maritima*), and Torrey pine (*Pinus torreyana* ssp. *torreyana*), are also present.

The vegetation varies in structure and composition with slope and soil characteristics. Vegetation emerging after a 1986 fire in chaparral on part of the mesatop included post-fire specialist plants, such as large-flowered phacelia (*Phacelia grandiflora*), western dichondra (*Dichondra occidentalis*), and golden eardrops (*Dicentra chrysantha*) (RECON 1994). Non-native weedy species were absent in this post-fire community, an indicator of the relatively undisturbed nature of the site.

b. Diegan Coastal Sage Scrub

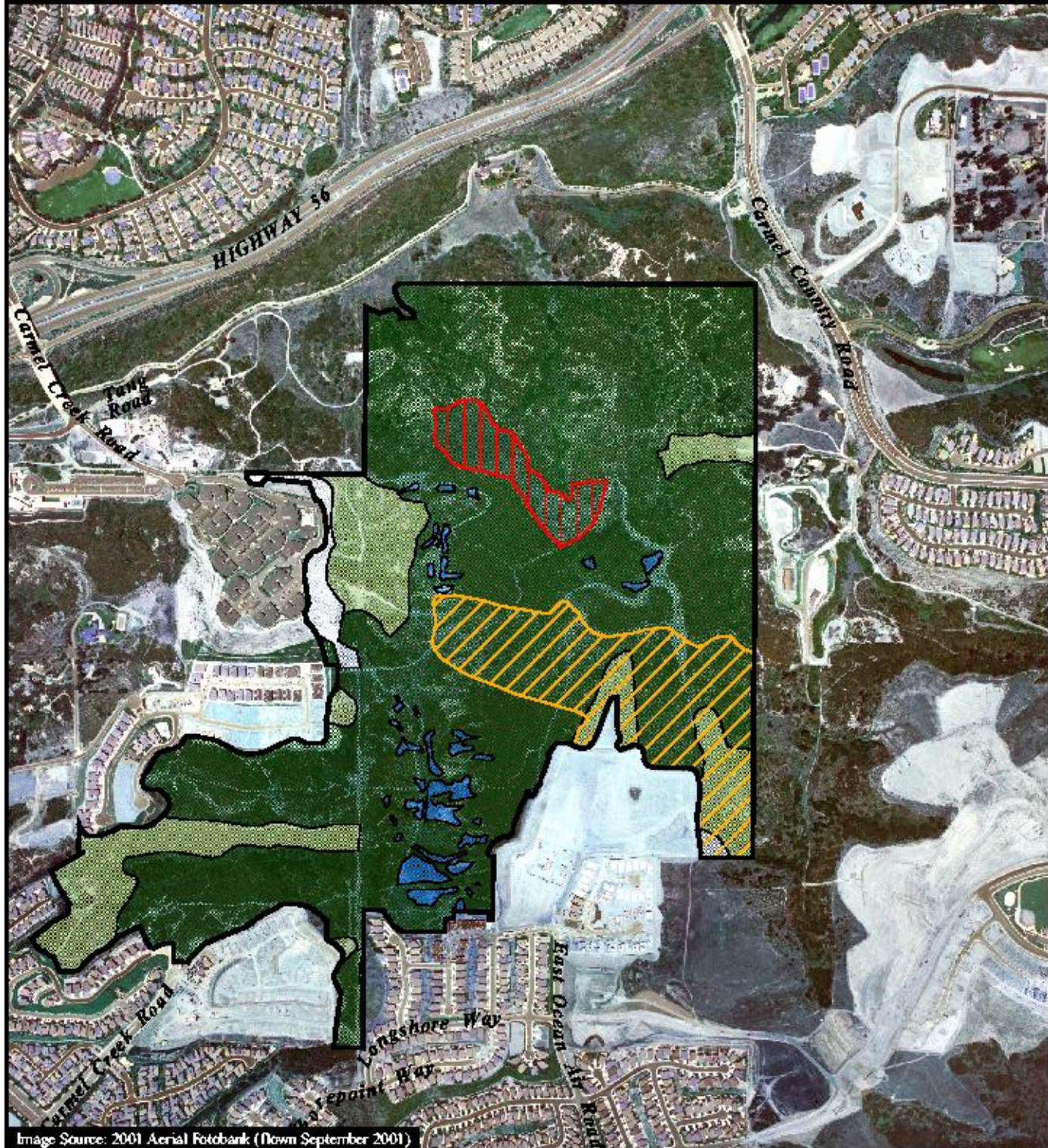
Diegan coastal sage scrub is a community composed of low, soft-woody subshrubs that grow actively in the winter and early spring. Diegan coastal sage scrub often occurs on sites with limited soil moisture, such as steep dry slopes or on clay soils that release water slowly. Dominant plants are California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*), and white sage (*Salvia apiana*) (Holland 1986).

Diegan coastal sage scrub is the secondmost abundant community on-site, occupying 26.2 acres, primarily along south-facing slopes in the large canyon, at the southeastern base of Carmel Mountain, and in chaparral openings on the west side of the mountain. Coyote bush (*Baccharis pilularis*) and broom baccharis (*Baccharis sarothroides*) are commonly associated within the canyon bottom of Carmel Mountain Preserve, on the southwestern portion of the Preserve. Other dominant species on-site are California sagebrush, California buckwheat, common encelia (*Encelia californica*), and black sage (*Salvia mellifera*).

c. Mesic Meadow/Seeps

Mesic meadow is not an official County of San Diego classification, but this community is more similar in vegetation to montane meadow and freshwater seeps, than freshwater marsh. Unlike freshwater marsh, the soil in the mesic meadows is moist only during the rainy season, and is dry during summer months. On Carmel Mountain Preserve, areas that can best be described as mesic meadows and seeps are dominated by mariposa rush and blue-eyed grass (*Sisyrinchium bellum*). These mesic meadows and seeps transition into an herbaceous community dominated by ashy spike-moss. In addition to these species, ashy spike-moss (*Selaginella cinerascens*) dominates the herbaceous community present in this area. Shooting stars (*Dodecatheon clevelandii*), dot-seed plantain

(*Plantago erecta*), popcorn flower (*Plagiobothrys* spp.), wavy-leaved soap plant (*Chlorogalum parviflorum*) are also present. These vegetation communities were originally mapped as non-native grassland by RECON (1994). Given the current plant species, hydrology, and soils present, it was remapped as mesic meadow, seeps, and the ashy spike-moss herbaceous community.



Carmel Mountain Preserve

Vegetation Communities (Recon, 1996)

- Diegan coastal sage scrub
- Southern maritime chaparral
- Mesic meadow, seeps and *Selaginella*
- Disturbed

Burn area (1990's)

Burn area (1986)



0 Feet 1000

FIGURE 3-3
Vegetation on Carmel Mountain Preserve

These areas also contain vernal pools with typical species, including toad rush (*Juncus bufonius*), grass poly (*Lythrum hyssopifolia*), and woolly-heads (*Psilocarpus tenellus*) (RECON 1994).

d. Vernal Pools

Vernal pools occur in the central and southern portion of the Carmel Mountain Preserve, east of the SDG&E easement (City of San Diego 1998a). These vernal pools are disturbed to varying degrees; those within dirt roads and trails have little vegetation, others are scattered among the chaparral shrubs and have both native and invasive exotic species. Several sensitive plant and animal species also occur within these disturbed vernal pools.



Photograph 3-2: Vernal Pool Within a Dirt Road on Carmel Mountain

5. Wildlife

Carmel Mountain Preserve supports diverse wildlife species, including at least 11 mammal, 51 bird, 4 reptile, 1 amphibian, and 1 invertebrate species. The diversity of animals observed and expected to occur in this area is typical of relatively undisturbed native habitat in coastal San Diego County. Wildlife species that have been observed at Carmel Mountain Preserve are listed in Appendix 3b.

6. Sensitive Biological Resources

The assessment of the sensitivity of plant communities and species follows the guidelines presented in the MSCP. The Multiple Habitat Planning Area (MHPA) lands are those that have been included within the City's MSCP Subarea Plan for habitat conservation. These lands have been determined to provide the necessary habitat quality, quantity, and connectivity to sustain the unique biological diversity of the San Diego region. The MHPA lands are considered by the City to be a sensitive biological resource.

A total of 85 sensitive plant and wildlife species are considered to be adequately protected within MHPA lands. These sensitive species are MSCP covered species and are included in the Incidental Take Authorization issued to the City by federal and state governments as part of the City's MSCP Subarea Plan. There are 14 plants that are considered "narrow endemic species" based on their limited distributions in the region. These narrow endemics are sensitive biological resources. All 14 narrow endemic plants are also MSCP covered species and some are state or federally listed as threatened or endangered species. All species listed by state or federal agencies as rare, threatened, or endangered or proposed for listing are considered sensitive biological resources. The habitat that supports a listed species or a narrow endemic species is also a sensitive biological resource.

Species that are not MSCP covered species, but are on Lists 1B or 2 of the California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* (Skinner and Pavlik 1994), California fully protected species, and California species of special concern are also considered sensitive. Impacts to these species, if considered significant, may require mitigation according to California Environmental Quality Act (CEQA) guidelines.

Assessments for the potential occurrence of sensitive species are based upon known ranges, habitat preferences for the species, species occurrence records from the Natural Diversity Data Base (NDDB), and species occurrence records from other sites in the vicinity of the project site.

Locations of sensitive species that have been observed at Carmel Mountain during various surveys are shown on Figure 3-4. Some locations where sensitive species were observed during past surveys were not mapped when the species was encountered. Certain sensitive species require further monitoring when funding becomes available.

The City of San Diego has been monitoring selected species discussed below (see Chapter 9) as required by the MSCP. When funding becomes available, other sensitive species should be monitored to determine the status of their populations on the Preserve. Recommendations for management and monitoring are also provided in Chapter 9 for other sensitive species listed below that are not covered by MSCP.

a. Sensitive Plant Species on the Carmel Mountain Preserve

Sensitive plant species that have been observed on Carmel Mountain Preserve are listed in Appendix 3c, with the codes explained. Those species listed below, which are covered by the MSCP (see Appendix 4 for complete list) have specific management directives that have been included in Chapter 9. Several other sensitive plant species that have not been seen on Carmel Mountain Preserve could occur there and may be found during future monitoring and studies.

One federally endangered plant species, Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*), and one state endangered species, short-leaved dudleya (*Dudleya blochmaniae* ssp. *brevifolia*), are present on-site.

An additional 10 species on the California Native Plant Society's List 1B and 2,

considered eligible for state listing by CDFG and CEQA-significant have been identified on-site:

Orcutt's brodiaea

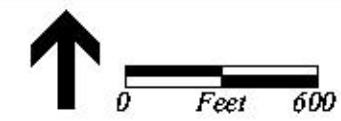
(*Brodiaea orcuttii*)

Summer holly

(*Comarostaphylis diversifolia*
ssp. *diversifolia*)

Del Mar sand aster

(*Lessingia filaginifolia* var. *filaginifolia*
=*Corethrogyne filaginifolia* var. *incana*)



-  Carmel Mountain Preserve
- Vernal Pools**
(This map shows general location of vernal pools. See Chapter 8 for detailed vernal pool mapping.)
 Source: City of San Diego, revised in part by RECON (2001/2002)
- Sensitive Plants**
- Adolphia californica*
 Source: Recon
 - Arctostaphylos glandulosa ssp. crassifolia*
 Source: Dudek
 Source: MSCP
 - Brodiaea orcuttii*
 Source: Recon
 Source: MSCP
 - Calandrinia maritima*
 Source: Recon
 - Ceanothus verrucosus*
 Source: Dudek
 Source: MSCP
 - Coreopsis maritima*
 Source: Recon
 - Lessingia filaginifolia* var. *filaginifolia*
 Source: MSCP
 - Dichondra occidentalis*
 Source: Recon
 - Dudleya brevifolia*
 Source: MSCP
 Source: City of San Diego
 - Ferocactus viridescens*
 Source: MSCP
 - Muhlia clevelandii*
 Source: MSCP
 - Ophioglossum californicum*
 Source: Recon
 - Pinus torreyana* ssp. *torreyana*
 Source: MSCP
 - Selaginella cinerascens*
 Source: Recon
- Sensitive Animals**
- Source: City of San Diego (NDDb)
 -  Coastal California gnatcatcher
Source: MSCP
 -  Belding's orangethroat whiptail
 -  San Diego horned lizard
 -  Southern mule deer
 -  Mountain lion
 - Source: Recon
 -  Bell's sage sparrow
 -  San Diego fairy shrimp
 -  Southern California rufous-crowned sparrow
 -  Western spadefoot toad

FIGURE 3-4
Sensitive Species on Carmel Mountain Preserve

Torrey pine
(*Pinus torreyana* ssp. *torreyana*)

Coast barrel cactus
(*Ferocactus viridescens*)

Sea dahlia
(*Coreopsis maritima*)

Nuttall's scrub oak
(*Quercus dumosa*)

San Diego goldenstar
(*Muilla clevelandii*)

Wart-stemmed ceanothus
(*Ceanothus verrucosus*)

California adolphia
(*Adolphia californica*)

Three other plant species considered by CNPS to have limited distribution (List 4 species) are also found on-site:

Western dichondra
(*Dichondra occidentalis*)

Seaside calandrinia
(*Calandrinia maritima*)

California adder's-tongue fern
(*Ophioglossum californicum*)

California adolphia (*Adolphia californica*). California adolphia is a CNPS List 2 species in the buckthorn family (Rhamnaceae). This species generally occurs in Diegan coastal sage scrub or near the edge of chaparral, in dry locales with shrubs four to five feet tall. On Carmel Mountain, California adolphia is present in the southern maritime chaparral, on the southeastern portion of the Preserve. The population on the Preserve has been disturbed by road grading and trash dumping. This shrub flowers from December to April and loses its leaves in late summer and fall, making it difficult to find. Its spiny stems are identifiable at close range year-round, however. It is associated with San Miguel and Friant soils (Reiser 2001). Its geographic range extends from San Diego County south into Baja California. In San Diego County, it is found from the Carlsbad area south into the Proctor Valley and Otay region (Beauchamp 1986).

Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*) is federally listed as an endangered species (USFWS 1996) and is a covered species under the

MSCP (species management directives are in Chapter 9). This shrub is in the heath family (Ericaceae), and can be distinguished from the common Eastwood manzanita (*A. glandulosa* ssp. *glandulosa*) by its shorter stature (to four feet) and by leaf and bract characters. This subspecies occurs in southern maritime chaparral on sandstone terraces and bluffs in central coastal San Diego, and in northern coastal Baja California. Urban expansion and clearing for agriculture have been responsible for most of the loss of this species. Del Mar manzanita is scattered throughout southern maritime chaparral on Carmel Mountain Preserve, along the north side and southwest portion of Carmel Mountain. The population is extant; however, details of its current status are to be determined by surveys conducted by the City of San Diego.

South coast saltbush (*Atriplex pacifica*). South coast saltbush is an annual herb and a member of the Chenopodiaceae (goosefoot) family. It is a CNPS List 1B species. This species is found within coastal bluff scrub and coastal sage scrub from Ventura County south to Baja California, Mexico. South coast saltbush superficially resembles the introduced Australian saltbush (*Atriplex semibaccata*), common throughout southern California. Future surveys and monitoring are recommended, when funding becomes available.

Orcutt's brodiaea (*Brodiaea orcuttii*). Orcutt's brodiaea is a CNPS List 1B species. Orcutt's brodiaea is considered sensitive and is an MSCP covered species (species management directives are in Chapter 9). It is found only in San Diego, Riverside, and Orange Counties and in Baja California, Mexico (Skinner and Pavlik 1994). This herbaceous perennial in the lily family (Liliaceae) sprouts from corms. Its preferred habitat in San Diego County is vernal moist grasslands, mima mound topography, vernal pools edges, and occasionally along stream banks. It is known to occur in clay, and sometimes serpentine, soils including Stockpen gravelly loam on Otay Mesa and Redding gravelly loam on Mira Mesa (Reiser 2001). This

species occurs in seasonal wetlands on Carmel Mountain Preserve, including meadows and vernal pools. Details of its current status are to be determined by surveys conducted by the City of San Diego.

Seaside calandrinia (*Calandrinia maritima*). Seaside calandrinia is a CNPS List 4 species, with low numbers throughout its range along the coast from Santa Barbara County southward into Baja California and on the Channel Islands. This succulent annual herb in the purslane family (Portulacaceae) flowers from March through May. It is typically found on sandy bluffs and openings in coastal sage scrub flats near the beach. It has been mapped on Gaviota fine sandy loam and Terrace Escarpment soils (Reiser 2001). Because the species inhabits coastal environments, development has reduced the number of populations throughout its range. On Carmel Mountain Preserve, this species is present in southern maritime chaparral north and north west of Carmel Mountain. The status of the population is unknown, but presumed stable due to lack of disturbance from vehicular and recreational traffic. Future monitoring of this species is recommended, when funding becomes available.

Wart-stemmed Ceanothus (*Ceanothus verrucosus*). Wart-stemmed ceanothus is in the buckthorn, or Rhamnaceae, family. It is a County of San Diego Group B species, an approved MSCP covered species, and a CNPS List 2 species (Species management directives are in Chapter 9). This large evergreen shrub occurs along coastal San Diego County and northern Baja California, Mexico (Reiser 2001). Wart-stemmed ceanothus is found as a component of southern mixed chaparral or southern maritime chaparral plant communities (Holland 1986). This species produces clusters of small white lilac-like flowers that appear between January and April. The small thick leaves and corky “warts” on the stem are characteristic of the species (Munz 1974). This plant is threatened by loss of habitat to development (Skinner and Pavlik 2001). On Carmel Mountain Preserve, this species is found in southern maritime

chaparral (in the hundreds). Wart-stemmed ceanothus is common within southern maritime chaparral on the Preserve. Future monitoring of this species is recommended, when funding becomes available.



Photograph 3-3: Wart-stemmed Lilac
Summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*). Summer holly is a CNPS List 1B species and a County of San Diego Group A species. This evergreen shrub in the heath family (Ericaceae) reaches heights of 15 feet and produces a small white flower from April to June (Munz 1974). Summer holly is found in the chaparral in Orange, Riverside, and San Diego Counties, as well as Baja California, Mexico. In San Diego County it generally occurs at low elevations in chaparral communities near the coast. Summer holly is threatened by development and gravel mining (Skinner and Pavlik 2001). It has been documented as occurring on Carmel Mountain Preserve, but its location has not been mapped. Future monitoring of this species is recommended, when funding becomes available.

Sea dahlia (*Coreopsis maritima*). Sea dahlia is a CNPS List 2 species. This perennial herb in the sunflower family (Asteraceae) has semi-succulent leaves and reaches two feet in height. It flowers from March to June. It typically grows on coastal bluffs and dunes below 200 feet elevation in coastal strand or coastal sage scrub. Its range extends along the coast from Encinitas in San Diego County south to near San Quentin, Baja California. On Carmel Mountain Preserve, sea dahlia is present on north slopes within southern maritime chaparral. The population is currently presumed stable, due to lack of disturbance

in that area of the Preserve. Threats to the species include loss of habitat and erosion of remaining sandstone seabluft habitat. Future monitoring of this species is recommended, when funding becomes available.



Photograph 3-4: Sea Dahlia



Photograph 3-5: Sea Dahlia Flowers

Western dichondra (*Dichondra occidentalis*). Western dichondra is a CNPS List 4 species, indicating that it has limited distribution or is infrequent throughout its range. Its range extends from Ventura County south into Baja California, including the Channel Islands. In San Diego County, it is known from Agua Hedionda south to Point Loma and inland to Poway, Otay Mountain, and the Tijuana Hills

(Beauchamp 1986). This small perennial herb in the morning-glory family (Convolvulaceae) flowers from March to May. It often grows almost completely hidden under shrubs or trees in coastal sage scrub and chaparral, or among rocky outcrops in grasslands. It grows primarily in dry sandy soils including Heuerhuero soils and Hambright gravelly clay loam (Reiser 2001). On Carmel Mountain Preserve, this species is found in southern maritime chaparral, adjacent to and within the 1986 burned area. The numbers of western dichondra are in a slow decline in southern California because habitat is being lost to development and weeds are invading native plant communities. Future monitoring of this species is recommended, when funding becomes available.



Photograph 3-6: Western Dichondra

Short-leaved dudleya (*Dudleya blochmaniae* ssp. *brevifolia* = [*Dudleya brevifolia*]). Short-leaved dudleya is a perennial succulent plant species that is found in small disjunct populations in San Diego County (Moran 1951; Munz 1974; Hickman 1993). It occurs on Torrey sandstone in the vicinity of Del Mar and La Jolla. Soils are mapped as Carlsbad gravelly loam sand (Reiser 2001). Short-leaved dudleya is a state listed endangered species. The species is not listed by the USFWS. The short-leaved dudleya is a City of San Diego MSCP covered species. It is considered rare and endangered by the California Native Plant Society (Skinner and Pavlik 1994) and is on the California Department of Fish and Game's NDDDB List of Special Plants (State of California 2001a). It is listed as an endangered species by the

state of California and a MSCP covered species (MSCP species management directives are in Chapter 9). This tiny, sprouting perennial herb in the stonecrop family (Crassulaceae) is restricted to only five locations in the Del Mar and La Jolla areas in San Diego County. It is found on Carlsbad gravelly loam (derived from Torrey sandstone) in open areas of chamise chaparral or Torrey pine forest. Ashy spike-moss is one of the few plants that occurs with it in these openings. Small iron-bearing concretions are present in the soil where short-leaved dudleya has been found (Reiser 2001). Short-leaved dudleya can be distinguished from Blochman's dudleya (*D. blochmaniae* ssp. *blochmaniae*) by its smaller (7–15 millimeter) spoon-shaped leaf, and from variegated dudleya (*D. variegata*) by its white, rather than yellow flowers.

A dense population occurs on the edge of the west-facing terrace of Carmel Mountain above the old quarry; another large population occurs nearby on the east side of the Carmel Mountain mesa in a broad open area.



Photograph 3-7: Short-leaved Dudleya Blooming at Carmel Mountain, Spring 2001



Photograph 3-8: Short-leaved Dudleya Flowers were Dense in Spring 2001

Coast barrel cactus (*Ferocactus viridescens*). Coast barrel cactus is a CNPS List 2 species and a MSCP covered species (species management directives are in Chapter 9). This perennial stem succulent in the cactus family (Cactaceae) ranges coastally from San Diego County southward into northern Baja California. The preferred habitat for coast barrel cactus is on hillsides in Diegan coastal sage scrub, particularly around rock outcrops or in cobbles on warm dry slopes with a southerly exposure. It is also found near vernal pools on Otay Mesa. It is associated with habitat (Stockpen gravelly clay loam, Miguel-Exchequer rocky silt loam, and Redding gravelly loam soils (Reiser 2001). This species is found throughout the Preserve, associated with rock outcrops and open areas. Coast barrel cactus is threatened by urbanization, vehicles, and horticultural collecting. Future monitoring of this species is recommended, when funding becomes available.

Del Mar sand aster (*Lessingia filaginifolia* var. *filaginifolia* [= *Corethrogyne filaginifolia* var. *linifolia*]). Del Mar sand aster is a CNPS List 1B species, with the highest rating for rarity, endangerment, and limited distribution (3-3-3) and is a covered species under the MSCP (species management directives are in Chapter 9). This perennial herb is a member of the sunflower family (Asteraceae) with gray-green leaves, violet ray flowers, and yellow disk flowers that appear in summer. Del Mar sand aster is found in open coastal sage scrub and southern maritime chaparral on weathered sandstone-derived soils. It is endemic to San Diego County from Batiquitos Lagoon in Carlsbad, south to Del Mar Mesa, Carmel Mountain, and Torrey Pines State Park. Del Mar sand aster is present adjacent to existing trails along the western and southwest portions of the Preserve in Diegan coastal sage scrub. The City of San Diego conducted a baseline survey in 2001 for this species. Details of its current status are to be determined from surveys.

San Diego golden-star (*Muilla clevelandii*). San Diego golden-star is a member of the plant family Liliaceae

(species management directives are in Chapter 9). This herbaceous perennial is a MSCP covered species and is on List 1B of the CNPS *Inventory* (Skinner and Pavlik 1994). San Diego golden-star is found only in southwestern San Diego County and northern Baja California, Mexico, where it occurs on clay soils in coastal sage scrub, chaparral, and grassland habitats (Munz 1974). It is a perennial bulb threatened by loss, degradation, and conversion of habitat. One population is documented on the Carmel Mountain Preserve, and current status of the population is unknown. Future monitoring of this species is recommended, when funding becomes available.

California adder's-tongue fern (*Ophioglossum californicum*). California adder's tongue fern is a CNPS List 4 whose range extends from the Sierra Nevada foothills from Butte to Merced County, to Monterey County, to San Diego, San Bernardino, and Orange Counties in southern California southward into Baja California, Mexico. In San Diego County, the fern has been reported from Kearny Mesa, Olivenhain, Proctor Valley, and Escondido (Beauchamp 1986). This perennial rhizomatous herb typically occurs on grassy slopes and near vernal pools and seeps, in coastal and foothill locations below 900 feet elevation. The California adder's tongue fern is easily observed during the springtime, but becomes inconspicuous later in the season. This species is associated with seasonal wetlands and meadows on the Preserve. Future monitoring of this species is recommended, when funding becomes available.

Torrey pine (*Pinus torreyana* ssp. *torreyana*). Torrey pine is a CNPS List 1B species and is a MSCP covered species (species management directives are in Chapter 9). Torrey pine is a tall, five-needled tree in the pine family (Pinaceae). Its range is restricted to the foggy coastal region near Del Mar in San Diego County, where the more moist climate and regular temperatures allow the pine to persist. Torrey pines grow on sandstone bluffs in the chaparral and pine forest (Reiser 2001) on

Huerhuero soils, Terrace escarpments, and Corralitos loamy sand. Healthy populations occur at both the southern and northern portion of Torrey Pines State Reserve, with peripheral populations on nearby private lands. Torrey pine has been widely planted in the area. All trees outside of historically documented groves and under 200 years of age are likely introduced (Reiser 2001). On the northwestern slope of Carmel Mountain seedlings have regenerated from planted trees.

Nuttall's scrub oak (*Quercus dumosa*).

Nuttall's scrub oak is a member of the Fagaceae family. This evergreen shrub is a CNPS *Inventory* (Skinner and Pavlik 1994) List 1B species that occurs in Santa Barbara, Orange, and San Diego Counties as well as in Baja California, Mexico. Nuttall's scrub oak is found within chaparral and coastal sage scrub vegetation on sandy or clay loam soils. This species occurs abundantly within southern maritime chaparral on the Preserve.

Ashy spike-moss (*Selaginella cinerascens*).

Ashy spike-moss is no longer considered a List 4 species by CNPS (State of California 2001a); however, due to the importance of this species to habitat and ecosystem stability, we still consider this species a sensitive resource. Ashy spike-moss is a prostrate perennial herb in the spike-moss family (Selaginellaceae) that reproduces by spores in March and does not bear flowers. It occurs in undisturbed coastal sage scrub and chaparral from Orange County south into Baja California. In undisturbed habitats, ashy spike-moss and other cryptogamic species provide resistance to weed invasion. Because these cryptogamic species effectively seal the soil surface, the chance of successful weed seed germination is greatly reduced. In San Diego County, ashy spike-moss is most often found near the coast south of Highway 78, particularly around the periphery of the city of San Diego. Ashy spike-moss is found throughout the Preserve, particularly in open spaces. Future monitoring of this species is recommended, when funding becomes available. See Chapter 8 for further discussion of this species.

b. Sensitive Animal Species on the Carmel Mountain Preserve

Sensitive wildlife species that are known to occur on Carmel Mountain are listed in Appendix 3d. Those species which are covered by the MSCP (see Appendix 4 for complete list) have specific management directives that have been included in Chapter 9. Other sensitive wildlife species that have not been seen on the Carmel Mountain Preserve occur in the vicinity and may be observed during future studies and monitoring.

Invertebrates

San Diego fairy shrimp (*Branchinecta sandiegonensis*). The San Diego fairy shrimp is federally listed as endangered and is covered by the City of San Diego's MSCP (species management directives are in Chapter 9), although no "take" is authorized under the City's permit. This species is restricted to vernal pools in coastal southern California and south to northwestern Baja California, Mexico (USFWS 2000). The life cycle of fairy shrimp is relatively simple, with larvae hatching out of resting eggs after being covered with water for a prescribed period of time, developing into adults, and mating and laying eggs before the pool dries. The development time is influenced both by the water temperature and the species-specific responses to environmental cues. San Diego fairy shrimp are found in vernal pools that are generally less than 30 centimeters deep. This species takes between 3 and 8 days to hatch and development to the adult stage takes between 7 and 20 days. They are generally found in pools without other fairy shrimp but have been found with Lindahl's fairy shrimp (*Branchinecta lindahli*) and Riverside fairy shrimp (*Streptocephalus woottoni*). This species has been identified in vernal pools along existing trails in the southern portion of the Preserve. Future surveys and monitoring of this species is recommended, when funding becomes

available. See Chapter 8 for further discussion of this species regarding its management.

Amphibians

Western spadefoot toad (*Spea hammondi*). The western spadefoot toad is a CDFG species of special concern. This species is found from central northern California through the coast ranges from San Francisco south into Baja California, Mexico (Stebbins 1985). The western spadefoot toad primarily frequents washes, floodplains of rivers, alluvial fans, alkali flats, temporary ponds, and vernal pools. This species is generally found in areas of open vegetation with sandy or gravelly soil (Stebbins 1985). The main threat to the western spadefoot toad is believed to be habitat loss and fragmentation, although pesticide uses have been implicated as well. This species has been detected near vernal pool habitat, and within the northwest corner of the Preserve. Herpetofaunal monitoring on the Preserve has been implemented by the City of San Diego. These surveys will contribute in determining their current status.

Reptiles

San Diego horned lizard (*Phrynosoma coronatum blainvillii*). The San Diego horned lizard is a CDFG species of special concern and an approved MSCP covered species (species management directives are in Chapter 9). This lizard ranges from coastal southern California to the desert foothills and into Baja California. It is often associated with coastal sage scrub, especially areas of level to gently sloping ground with well-drained loose or sandy soil (Mills 1991). This animal usually avoids dense vegetation, preferring 20 to 40 percent bare ground in its habitat. Populations along the coast and inland have been severely reduced by loss of habitat. Where it can be found, the San Diego horned lizard can be locally abundant, with densities near 20 adults per acre. They are largely dependent on harvester ants for food, which contributes to about half their diet. Adults are active

from late March to late August; young are active from August to November or December. This species has been detected throughout the Preserve in chaparral and coastal sage scrub.

Herpetofaunal monitoring on the Preserve has been implemented by the City of San Diego. These surveys will contribute in determining their current status.



Photograph 3-9: San Diego Horned Lizard

Belding's orangethroat whiptail

(*Cnemidophorus hyperythrusbeldingi*). The Belding's orangethroat whiptail is a CDFG species of special concern and an approved MSCP covered species (species management directives are in Chapter 9). This species ranges from southwestern San Bernardino County to the tip of Baja California, Mexico, in areas of low, scattered brush and grass with loose sandy loam soils. It can be found in open coastal sage scrub, chaparral, washes, streamsides, and other sandy areas with rocks, patches of brush, and rocky hillsides (Stebbins 1985). The orangethroat whiptail feeds primarily on subterranean termites. It is active during the spring and summer months and hibernates during the fall and winter. Adult orangethroat whiptails generally hibernate from late July or early August until late April. The immature whiptail has a shorter inactivity period, usually hibernating from December through March. Hibernation sites are on soft, well-drained slopes with southern exposure and little or no vegetation cover, and road cuts tend to be suitable. The orangethroat whiptail has declined within its range as a result of habitat loss and fragmentation (McGurty 1980). This species is anticipated to occur in various parts of the

Preserve. It has been detected in the past on the northern portion of the Preserve.

Herpetofaunal monitoring on the Preserve has been implemented by the City of San Diego. These surveys will contribute in determining their current status.

Two-striped garter snake (*Thamnophis hammondi*)

The two-striped garter snake is a federal sensitive species that may grow as long as 36 inches though 18 to 24 inches is more usual. Its dorsal scales are keeled, which breaks up the reflection of light and results in a dull luster. The overall color is olive drab with a single yellowish stripe running down each side of the body. Patterned into the dorsal coloration are four rows of small, dark spots. The belly is dull yellow, or sometimes salmon colored. The two-striped garter snake ranges in coastal California from the vicinity of Salinas south to El Rosario in Baja California. They are normally found in or near permanent fresh water, inhabiting streams, ponds, and lakes throughout their range. They are often found even in temporary bodies of water such as vernal pools. It is the most common snake in southern California, and it is not unusual to encounter several individuals at a time. Activity is most common around dusk and in the early evening. Adults feed on frogs, tadpoles, toads, insect larvae, fish, fish eggs, and earthworms. The two-striped garter snake is ovoviviparous. Breeding commences in April and May and continues throughout the summer months. Gestation is approximately nine weeks. As many as 25 young may be born, though 12 to 13 is more common.

Herpetofaunal monitoring on the Preserve has been implemented by the City of San Diego. These surveys will contribute in determining their current status.

Northern red diamond rattlesnake

(*Crotalus exsulex*). The northern red diamond rattlesnake is a CDFG species of special concern. This species occurs below 1,200 meters (4,000 feet) on both sides of the Peninsular Ranges of southwestern California in coastal sage scrub, desert scrub, open chaparral, woodland, and grassland habitats, as well as agricultural

fields (Stebbins 1985). This snake is commonly found in areas with rock outcrops. Population declines in the red diamond rattlesnake are generally attributable to impacts related to the increased development near habitat in which this snake is found.

Herpetofaunal monitoring on the Preserve has been implemented by the City of San Diego. These surveys will contribute in determining their current status.



Photograph 3-10: Red Diamond Rattlesnake Observed Adjacent to Short-leaved Dudleya Population at Carmel Mountain, Summer 2001

Birds

White-tailed kite (*Elanus leucurus*). The white-tailed kite is a California fully protected species that occurs in coastal lowland areas from Oregon to northern Baja California, Mexico (National Geographic Society 1983). This resident bird nests in riparian woodlands, live oaks, or sycamore groves which border grassland or open fields (Unitt 1984). The white-tailed kite forages over open areas and grasslands feeding primarily on small rodents and insects (National Geographic Society 1983). This species is known to roost in large communal groups (Unitt 1984). White-tailed kite populations in southern California have declined due to the loss of nesting and foraging habitat. This species was observed during recent surveys on the Preserve by RECON.

Northern harrier (*Circus cyaneus*). Northern harriers are a CDFG species of special concern, and nesting sites are considered sensitive by CDFG. This raptor is also an approved MSCP covered species (species management directives are in

Chapter 9). This species is a fairly common winter visitor and a formerly widespread breeder throughout California. The northern harrier hovers close to the ground while foraging in grasslands, agricultural fields, and coastal marshes. The northern harrier most commonly nests on the ground at the edge of marshes but will also nest on grasslands, in fields, or in areas of sparse shrubs (Zeiner et al. 1990). This species has been nearly eliminated as a nesting species in southern California because of disturbance and loss of suitable habitat (Small 1994). In San Diego County, northern harriers nest at Camp Pendleton and the Tijuana River (Unitt 1984). This species was observed during recent surveys on the Preserve by RECON.

Cooper's hawk (*Accipiter cooperii*). The Cooper's hawk is a CDFG species of special concern and is an approved MSCP covered species (species management directives are in Chapter 9). Cooper's hawk ranges throughout most of the United States (National Geographic Society 1983). The Cooper's hawk is an uncommon migrant and winter visitor and rare summer resident in San Diego County (Unitt 1984). In San Diego County, this hawk mainly breeds in oak woodland and southern cottonwood-willow riparian habitats, but also will use eucalyptus trees (Unitt 1984). The Cooper's hawk forages primarily on songbirds but is also known to eat small mammals (National Geographic Society 1983). Although quantitative data is unavailable, Unitt (1984) speculates that breeding Cooper's hawks have declined in San Diego County as a result of human disturbance related to urban and agricultural development. The breeding habitat in the project area is marginal for Cooper's hawks; however, there is a low to moderate potential for Cooper's hawk to forage over the project area.

Western burrowing owl (*Speotyto cunicularia hypugaea*). The western burrowing owl is a CDFG species of special concern, and a MSCP covered species (species management directives are in Chapter 9). This species is primarily restricted to the western United States and

Mexico (National Geographic Society 1983). In San Diego County, the burrowing owl is an uncommon and declining resident which ranges throughout the coastal lowlands in grasslands, agricultural areas, and coastal dunes (Unitt 1984). The burrowing owl is nocturnal and perches during daylight at the entrance to its burrow or on low posts. Urbanization has greatly reduced the amount of suitable habitat for this species. This species was documented during surveys by RECON (1994).

California horned lark (*Eremophila alpestris actia*). The California horned lark is a CDFG species of special concern. The horned lark (*E. alpestris*) ranges throughout North America. However, the range of the California horned lark subspecies (*E. a. actia*) is along the coastal slopes of California from Sonoma County to San Diego County and includes most of the San Joaquin Valley (Grinnell and Miller 1944). Horned larks which occur in coastal San Diego County during the breeding season are members of this subspecies (*E. a. actia*), although other subspecies are found in San Diego County during the winter. In San Diego County, the California horned lark typically inhabits areas with sparse vegetation, including sandy shores, grasslands, mesas, and agricultural lands. Decline of this species is generally attributed to urbanization and human disturbance. This species was documented during surveys by RECON (1994), most likely in open areas with little vegetation found throughout the Preserve.

Blue-gray gnatcatcher (*Polioptila caerulea*). The blue-gray gnatcatcher is on the sensitive species list for the City of San Diego. The blue-gray gnatcatcher is distributed throughout Mexico and the U.S., excluding northern plains states and the northwest. Locally, this species is a fairly common migrant and winter visitor and a rare and localized summer resident. The blue-gray gnatcatcher winters in dense riparian undergrowth, weedy/brushy agricultural areas, thickets in desert washes, and occasionally chaparral. It breeds in foothill chaparral, desert-edge scrub, and mesquite thickets. Brood-parasitism by

brown-headed cowbirds is one contributing reason to the decline of this species. This species was documented during surveys by RECON (1994), most likely within southern maritime chaparral.

Future surveys and monitoring of this species is recommended, when funding becomes available.

Coastal California gnatcatcher (*Polioptila californica californica*). The coastal California gnatcatcher is federally listed as threatened, a CDFG species of special concern, and a MSCP covered species (species management directives are in Chapter 9). This resident species occurs below the 2,000-foot elevation level in the coastal slopes of southern California from the Ventura County and the Los Angeles basin south to Baja California, Mexico (Atwood 1980; Jones and Ramirez 1995). It is strongly associated with coastal sage scrub vegetation. During dry months, the species will forage in adjacent riparian areas. Breeding territory sizes for gnatcatcher pairs have been found to vary from two acres to in excess of 40 acres. The coastal California gnatcatcher population in southern California has been reduced through loss of habitat to urban and agricultural development of the coastal slopes. Nest predation by various animals and brood parasitism by brown-headed cowbirds may also be reducing the population (Atwood 1980; Unitt 1984). This species was documented during surveys by RECON (1994) in Diegan coastal sage scrub and southern maritime chaparral habitat on the Preserve. Future surveys and monitoring of this species is recommended, when funding becomes available.

Loggerhead shrike (*Lanius ludovicianus*). The loggerhead shrike is a CDFG species of special concern. This species inhabits most of the continental U.S. and Mexico and is a year-round resident of southern California. The loggerhead shrike prefers open habitat with perches for hunting and fairly dense shrubs for nesting (Small 1994). In southern California, this bird inhabits grasslands, agricultural fields, chaparral, and desert scrub (Unitt 1984). Loggerhead shrikes feed

on small reptiles and insects that they often impale on sticks or thorns before eating (Robbins et al. 1983). Loggerhead shrike populations are declining, likely due to urbanization and loss of habitat. This species was documented during surveys by RECON (1994), most likely within open areas of chaparral and coastal sage scrub. Future surveys and monitoring of this species is recommended, when funding becomes available.

Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*).

The southern California rufous-crowned sparrow is a CDFG species of special concern and a MSCP covered species (see Chapter 9 for species management directives). This resident bird ranges throughout coastal southern California, from Santa Barbara County south to San Diego County and into northwestern Baja California (Grinnell and Miller 1944). Nests are most often made on the ground. Habitat affiliations are coastal sage scrub, chaparral, and adjacent grassy areas (Unitt 1984). Insects are the primary food item of this species. Urbanization has decreased the amount of habitat suitable for southern California rufous-crowned sparrows. This species was documented during surveys by RECON (1994), within southern maritime chaparral and Diegan coastal sage scrub. Future surveys and monitoring of this species is recommended, when funding becomes available.

Bell's sage sparrow (*Amphispiza belli belli*). Bell's sage sparrow is a CDFG species of special concern. Bell's sage sparrow is an uncommon to locally fairly common resident along the extreme west coast of California. Its breeding range is along the coastal slopes from Trinity County south into northwestern Baja California. Locally, it can be found in the interior chaparral and coastal sage scrub habitats, especially dense stands of chamise chaparral (Small 1994). This race is essentially sedentary. Male Bell's sage sparrows show high breeding territory tenacity, even when the habitat is altered dramatically (Ehrlich et al. 1988). This species feeds primarily on

spiders, insects, and seeds while breeding, and seeds during the winter. This species was documented during surveys by RECON (1994), within southern maritime chaparral habitat.

Future surveys and monitoring of this species is recommended, when funding becomes available.

Grasshopper sparrow (*Ammodramus savannarum*). Although they have no official status with resource agencies, grasshopper sparrows are considered locally uncommon. In addition, the County gives "special attention" to this species during the development of the North County MSCP as reported in their update on the plan published on their website (County of San Diego 2001). This species has a patchy distribution within grasslands along coastal California and the foothills of the Sierra Nevadas. Grasshopper sparrows are semi-colonial and are locally rare throughout southern California with the numbers of grasshopper sparrows varying annually. Grasshopper sparrows are a localized summer resident in San Diego County and very rare in winter (Unitt 1984). This species was observed during surveys by RECON (1994) adjacent to the Preserve. Its current status is unknown.

Future surveys and monitoring of this species is recommended, when funding becomes available.

Mammals

San Diego black-tailed jackrabbit (*Lepus californicus bennettii*). The San Diego black-tailed jackrabbit is a CDFG species of special concern (State of California 2001b). This species can be found throughout southern California, with the exception of the high-altitude mountains. The black-tailed jackrabbit is strictly herbivorous, preferring habitat with ample forage such as grasses and forbs. The San Diego black-tailed jackrabbit breeds throughout the year with the greatest number of births occurring from April through May. This species is generally solitary, except when mating and raising young (Zeiner et al. 1990). This

species has been detected on the Preserve during recent surveys by RECON.

Mountain lion (*Felis concolor*). The mountain lion is a California fully protected species, and an MSCP covered species (species management directives are in Chapter 9). The mountain lion has shown dramatic decline in southern California. Mountain lions are widespread but uncommon in California, ranging from sea level to alpine meadows. Mountain lions are most abundant in riparian and bushy habitats, as long as mule deer (their primary food source) are present. Home ranges for adult animals range from 8 to 40 square kilometers, which is larger for males and smaller for females. Numbers appear to be on the increase in California (Zeiner et al. 1990), but their main threat is human development, which leads to fragmentation of the habitat. As the habitat is fragmented, the movement of the lions is restricted which increases the associations with humans (Zeiner et al. 1990). Mountain lion has been observed on the Preserve in the past; its current status is not known. Future surveys and monitoring of this species is recommended, when funding becomes available.

Southern mule deer (*Odocoileus hemionus fuliginata*). The southern mule deer is an MSCP covered species (species management directives are in Chapter 9). Mule deer inhabit a variety of plant communities, including coastal sage scrub, chaparral, grassland, woodland, and riparian systems. Distribution extends from Baja California into portions of San Diego, Orange, Imperial and West Riverside Counties. Adults' antlers may reach a four-foot spread. Mule deer primarily forage upon herbaceous plants, but will also eat various shrubs and trees (National Audubon Society 1991). Southern mule deer have been detected on the Preserve during recent surveys by RECON. It is presumed to be stable. Future surveys and monitoring of this species is recommended, when funding becomes available.

Draft

B. Del Mar Mesa Preserve

Several biological resources studies have been conducted on Del Mar Mesa for various parcels that have been considered for potential development or mitigation (Dudek 1996; City of San Diego 1996; Zedler 1989; Greenwood and Abbott 1980). These studies contribute to the bank of knowledge about the biological resources on the Del Mar Mesa Preserve and are summarized in this chapter. Because the extent of vernal pools is extremely depleted in the San Diego region there are an important resource to understand and protect on the Del Mar Mesa Preserve. The geology study by Greenwood and Abbott on Del Mar Mesa has also been summarized.

1. Preserve Location

Del Mar Mesa Preserve is located approximately 20 miles north of downtown San Diego, four miles inland from the Pacific Ocean, and approximately midway between Interstate 5 (I-5) and I-15. The mesa is bounded to the north by Carmel Valley and to the south by Peñasquitos Canyon, with Carmel Mountain to the west and Rancho Peñasquitos to the east.

2. Historical Land Use on the Del Mar Mesa Preserve

Del Mar Mesa Preserve has been historically perceived as public open space, providing for a variety of recreational activities such as hiking, mountain biking, and horseback riding. The region is surrounded by a number of development projects, primarily suburban, housing development and the future extension of Highway 56. The historical, and the prehistoric, use of the Del Mar Mesa Preserve lands, as is currently understood, is described in more detail in Chapter 10, Cultural Resources.

3. Topography, Soils, and Geology

a. Topography

The topography (Figure 3-5) of the large Del Mar Mesa is diverse with level mesa tops, steep slopes, major drainages, and undulating mima mounds and intervening depressions (vernal pools). Elevations range from 420 feet above sea level on the mesa to 200 feet above sea level in the bottom of Deer Canyon, which runs along the northern edge of the Preserve.

b. Geology

The underlying rocks at the vernal pools on Del Mar Mesa Preserve are part of the Late Eocene (45-40 million years old) Poway Conglomerate that built out over the ancient coastal plain as a large cone of conglomeratic sediment from an apex just north of Lakeside. The Late Eocene climate was semi-arid with 50-60 centimeters (cm) of annual rainfall that fell primarily during one season (Peterson and Abbott 1979). Eocene strata are dominated by rhyolite clasts brought from east of the modern Gulf of California by a large, long-distance, flood-type stream. The seasonality and lack of rainfall created soils under low moisture conditions that yielded caliches and clay in contrast to the dominant gravels and sands, and rare deposits of clay sediment on the high-energy, gravelly alluvial fan.

Most of the vernal pools in the San Diego area are developed upon gently dipping terraces cut into the Eocene alluvial fan by a westward-retreating ocean from Late Pliocene (over one million years ago) to present. The vernal pools studied on Del Mar Mesa Preserve are toward the eastern (older) side of the Linda Vista Terrace. In brief, the vernal pool topography is largely developed within the B_t horizon of an ancient soil profile now being dissected under changed climatic conditions.

c. Soils

Soils, along with other physical characteristics, are important components that affect what vegetation type will grow at a particular location. Soils are derived from weathering of parent rock materials, with additional mineral and organic material contributed from the deposition and decay of plants, animals, and microbes. Soils throughout San Diego County have been mapped at a gross scale by the U.S. Department of Agriculture (USDA). Soils on the Del Mar Mesa Preserve as mapped by the USDA (1973; Figure 3-6) are discussed below. Each soil type is generally associated with the topography as it changes over the Preserve. The Redding soils are located on the mesa tops. Salinas clay loam is the primary soil in the canyon bottoms such as in Deer Canyon. The Terrace Escarpments and Olivenhain cobbly loams are on the steep slopes.

Redding Series (Redding cobbly loam 9 to 30 percent slopes, Redding gravelly loam 2 to 9 percents slopes)

The Redding series consists of well-drained, undulating to steep gravelly loams that have a gravelly clay subsoil and a hardpan. These soils formed in old mixed cobbly and gravelly alluvium. Plant species typically associated with this soil series are chamise, California buckwheat, laural sumac, scrub oak, and annual forbs and grasses. The surface layer is typically yellowish-brown and light-brown, with medium and strongly acidic gravelly loam about 15 inches thick. The subsoil is yellowish-red and red, of very strongly acid gravelly clay loam and gravelly clay.

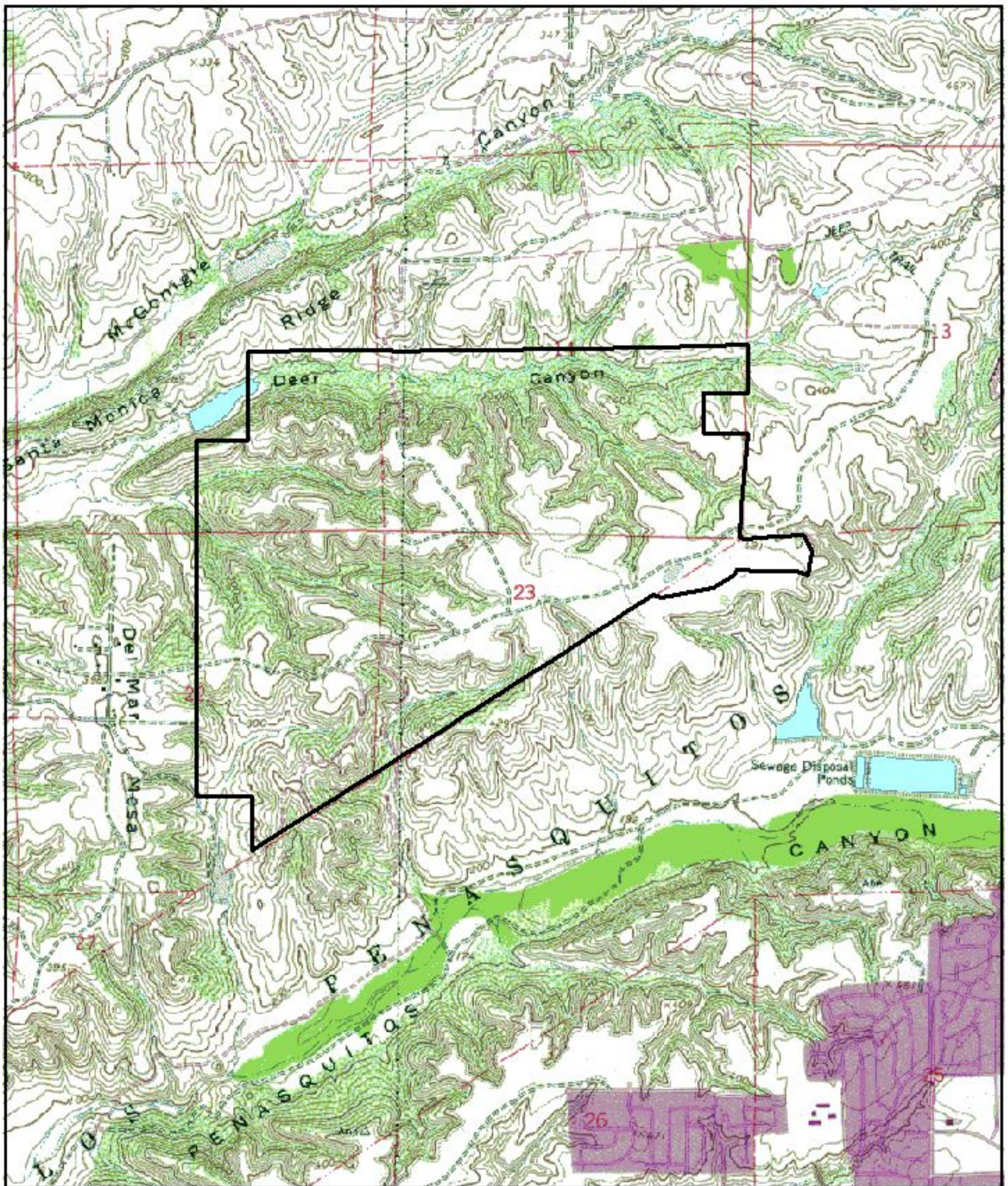
The Redding Cobbly loam (9 to 30 percent slopes) formation on-site is found in the nearly level ground in the central and eastern portions of the mesa, which are typically characterized by steep slopes and narrow gullies. These soils on the mesa are 8-10 inches deep over a hardpan where, on Del Mar Mesa Preserve, the vernal pools are

best developed. On the north and western portions of the mesa, Redding cobbly loam predominates on slopes of 9-30 percent. The soils are 10-20 inches deep over a hardpan.


The Redding gravelly loam (2 to 9 percent slopes), is an undulating to gently rolling soil, with an average slope of 3 percent. The topography consists of low, broad mounds, which are locally known as mimamounds.

Terrace Escarpments

Terrace escarpments consist of steep to very steep escarpments and escarpment-like



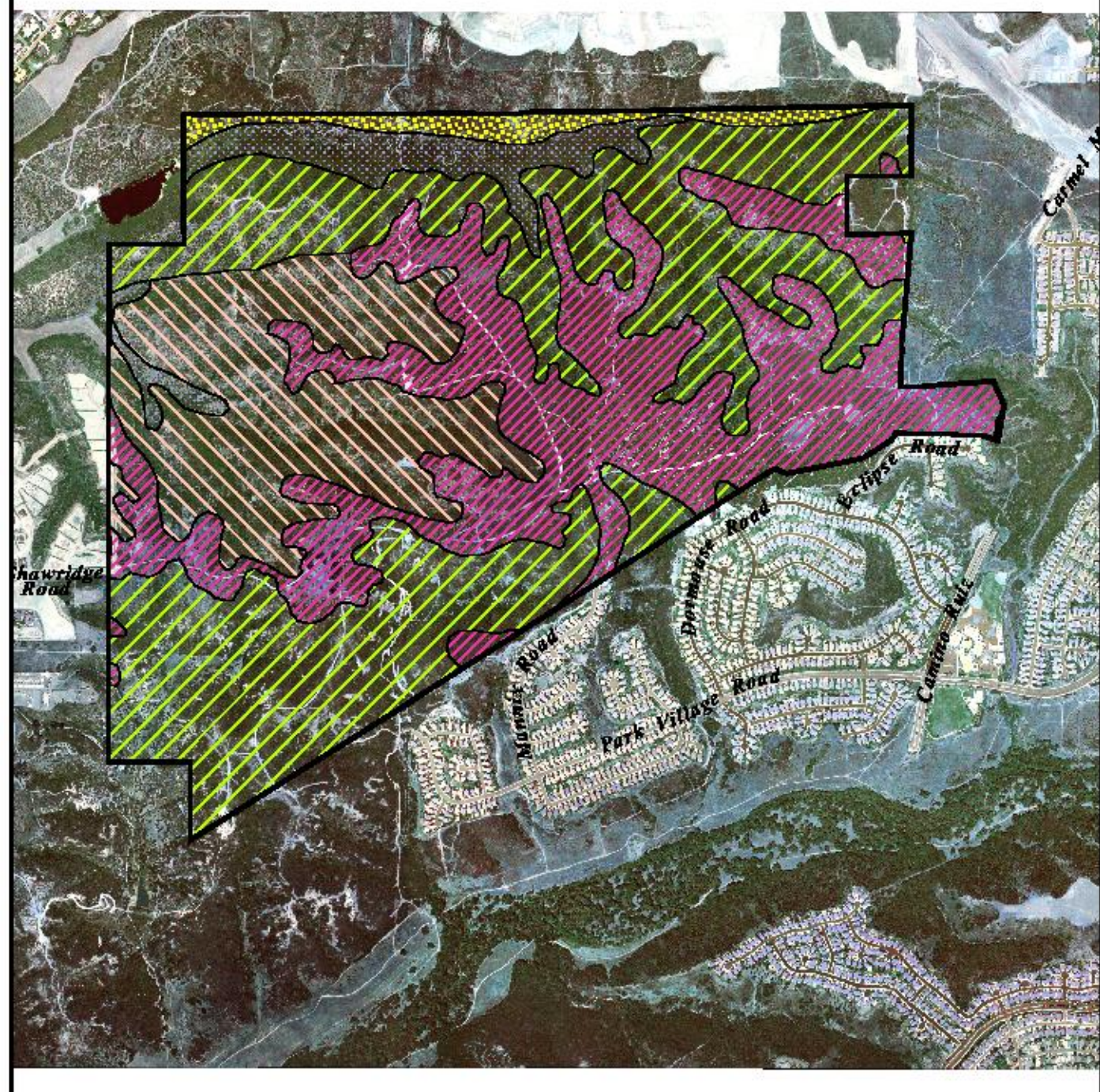
Map Source: USGS 7.5 minute topographic map series,
Del Mar quadrangle

 Del Mar Mesa Preserve









1:24,000
0 Feet 2000

FIGURE 3-5
Topography of
Del Mar Mesa Preserve



Soil Types

-  Olivenhain cobbly loam, 9 to 30 percent slopes (not visible at this scale)
-  Olivenhain cobbly loam, 30 to 50 percent slopes
-  Redding cobbly loam, dissected, 15 to 30 percent slopes
-  Redding gravelly loam, 2 to 9 percent slopes
-  Salinas clay loam, 2 to 9 percent slopes
-  Terrace escarpments



0 Feet 1500

FIGURE 3-6
Soils on
Del Mar Mesa Preserve

landscapes, which occur on nearly even fronts of terraces or alluvial fans. In most places there are 4 to 10 inches of loamy or gravelly soil over soft marine sandstone, shale, or gravelly sediments. Vegetation may consist of sparse cover of brush and annual forbs and grasses on south-facing slopes while fairly dense cover may cover north-facing slopes.

Steep to very steep terrace escarpments bound Del Mar Mesa Preserve to the south and line the north-facing slopes of Deer Canyon along the north side of the Preserve.

Olivenhain Series (Olivenhain cobbly loam, 9 to 30 percent slopes)

Olivenhain cobbly loam series consists of well-drained, moderately to deep cobbly loams that have a very cobbly clay subsoil. Plant species typically growing on soils of the Olivenhain series are chamise, scrub oak, California buckwheat, wild oats, sugar bush, smooth brome, and cactus. The steep slopes on the north side of Deer Canyon along the northern edge of the Preserve are Olivenhain cobbly loam which usually occurs on 9-30 percent slopes and has a very cobbly clay subsoil.

Huerhuero Series (Huerhuero loam 2 to 30 percent)

The main ridge of the western third of Del Mar Mesa Preserve supports moderately well-drained Huerhuero loam with a clay subsoil. Huerhuero loams occur on 2-30 percent slopes and have developed in sandy maritime sediments.

Salinas Series

The bottoms of the main drainages throughout the Del Mar Mesa Preserve are characterized by Salinas clay loam. No large rocks crop out on the mesa, but there are patches of rough, rocky soil and exposed erosion surfaces.

Vernal Pool Soils

In addition to the general soils information provided by USDA mapping, detailed studies of the soil underlying the H Series vernal pools at Del Mar Mesa Preserve were

conducted for Caltrans (Greenwood and Abbott 1980) for the purposes of determining: (1) how much watershed is required to sustain a water level sufficient to maintain the topographic and biologic equilibrium of the pools, and (2) can the existing watershed area be modified without significant risk to the existing equilibrium? These questions were important at the time because Caltrans was intending to buy these pools to mitigate impacts caused by State Route 52 across Clairemont and Kearney Mesas and they did not know if additional vernal pool and watershed lands would be added to their incipient preserve. This parcel of land (sometimes called the “bowtie” parcel because of its shape) was the first parcel dedicated to preservation and around which other lands for preservation have been added.

The study focused on two major (referred to as the “large pool” and the “smaller pool”) and several minor vernal pools (referred to as the “inter-pool area”) within a large drainage basin atop the mesa, important because the large pools are the largest known in San Diego County, and they support the northernmost occurrence of the endangered San Diego mesa mint.

The mesa top and the drainage basin are of such gentle slopes that precipitation gathers in isolated depressions as well as in the large pools. The total drainage basin area studied was 12.5 acres; the largest pool was 1.6 acres, the smaller pool 0.6 acre, and the inter-pool area 0.3 acre.

From test borings the investigators made estimates of layering depths and volumes of the various soil horizons within the drainage basin and under the vernal pools. The test boring locations were sited to provide the maximum information from the least amount of disturbance. The primary finding was the presence of two clay layers which contribute to the reservoir capacity of the vernal pool soils:

1. The upper loamy clay layer found throughout the basin ranges from 0.6 to 1.8 feet in thickness, with an average thickness of 1.06 feet.

2. The lower clay layer is highly compact, with a high content of expanding clays which serve to seal the bottom basin and it averages 2.15 feet thick.

The secondary finding based on the borings was the absence of a duripan (= hardpan, a hardened layer of soil usually found in the B horizon caused by the cementation of soil particles by a substance such as silica, sesuioxides, calcium carbonate, or organic matter) layer throughout the drainage basin. They had assumed that because the soils at the top were Redding soils and that Redding soils and vernal pools generally are underlain by duripan layers that act as aquicludes (underground layers of impermeable materials which prevent the movement of ground water or soil moisture) to seal the overlying soils from percolation loss, a duripan would be found. However, in this case, the seal was dependent upon swelling clays.

The dominant minerals in the clay layers (Table 3-1) were smectite and vermiculite

occurring in exceedingly fine (one micron), book-like packets that have a strong affinity to absorb water and expand. These fine clays were more abundant in the lower clay layer than the upper clay area. Coarser, less expansive illite and chlorite clays were more abundant in the upper layer than in the lower layer.

The investigators surmised that this pattern probably occurred during an ancient soil-forming process wherein the finer expandable clays were more easily transported downward by descending surface water to accumulate in a B_t horizon (a soil layer of maximum illuvation [downward movement and deposition] of silicate clay materials) soil profile. They conclude that the vernal pools on Del Mar Mesa Preserve must hold water because of the low permeability caused by swelling of the fine, clay mineral sediments, rather than by the presence of a duripan or hardpan layer. These clay soils form desiccation cracks when they dry and contract.

**TABLE 3-1
CLAY TYPES ON DEL MAR MESA PRESERVE**

Clay Type	Definition
Smectite	A type of clay more properly called montmorillonite, with an expanding crystal lattice. Sometimes refers to expandable clays other than montmorillonite.
Vermiculite	An expanding clay with greater expansion ratios than smectitic/montmorillonite clays
Illite	A hydrous mica with a crystal structure similar to montmorillonite but lacking its expansive characteristics; water is permanently trapped in the fixed spaces between the lattice layers
Chlorite	A hydrous mica clay with a very limited expandability
Montmorillonite	A clay with an expanding crystal lattice which makes it highly expandable upon the addition of water

The Redding soil is a relict soil or paleosol (ancient soil) and not a product of the present climate. This determination has been based on the weathering profiles on the Linda Vista Terrace which are characterized by a pronounced reddish color due to precipitation and oxidation of iron-bearing minerals at depths ranging up to at least 15 meters, and pH readings of 4.3 to 6, and

usually a discontinuous iron- and silica-cemented hardpan. Also in the associated sandy, back-beach ridges of the Carlsbad Series are opalized root tubes and a prominent layer of small pebble-sized, ironstone concretions. These characteristics do not represent our present climate. Coastal plain soils are thin and leached only near the surface; they are low in organic

matter and have some accumulation of calcium carbonate. The thick reddish zone indicates higher rainfall and deep moist surface condition not occurring at present. The incompatibility of the thick red soils and the modern climate let Carter (1957) to conclude they are relicts of an earlier humid climate.

4. Biology

Del Mar Mesa Preserve has been the subject of biological study for many years, particularly the unique type of vernal pools that are found there. Unlike other vernal pools in San Diego County, those on Del Mar Mesa Preserve are almost exclusively found within chaparral habitats, versus other pools that may occur in coastal sage scrub or grasslands.

The information in this section is compiled from existing biology studies and recent field checks for verification. Most of the information describing the existing conditions on Del Mar Mesa Preserve is taken from the Biological Resources Report and Impact Analysis for Subarea V North City Future Urbanizing Area prepared by Dudek & Associates, Inc., (1996) for the City of San Diego, Development Services Department, as part of the subregional planning efforts. Other information has also been incorporated, as referenced.

a. Vegetation Communities

Nine vegetation communities have been identified on Del Mar Mesa Preserve, as classified by Holland (Figure 3-7).

- Diegan coastal sage scrub
- Southern willow scrub
- Southern mixed chaparral
- Southern maritime chaparral
- Chamise chaparral
- Scrub oak chaparral
- Non-native grassland
- Vernal pool
- Eucalyptus woodland

Areas of bare dirt are considered disturbed. Plant species observed on Del Mar Mesa Preserve are listed in Appendix 3e.

Many of the native vegetation communities exist in disturbed as well as undisturbed conditions.



Photograph 3-11: Vegetation at the Northeast Corner of Del Mar Mesa Preserve

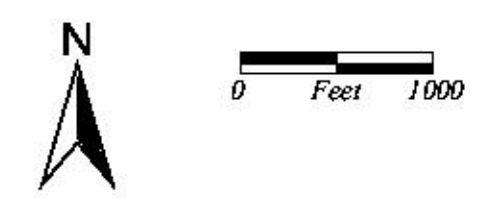
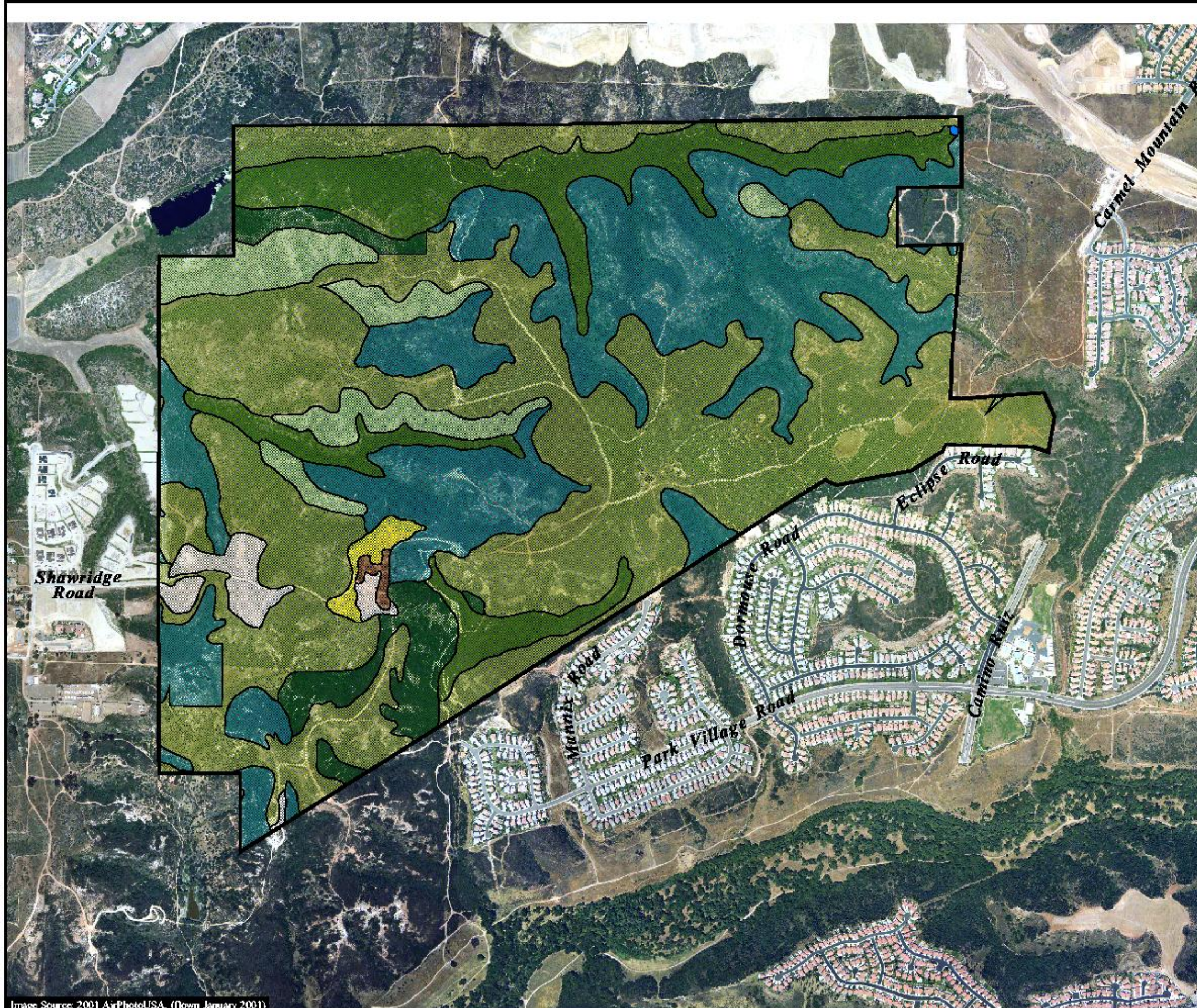
Diegan Coastal Sage Scrub

This community comprises 53.2 acres on the Preserve. Diegan coastal sage scrub (DCSS), the southern form of coastal sage scrub, is a plant community comprised of low-growing, aromatic, drought-deciduous soft-woody shrubs that have an average height of approximately three to four feet. The plant community is typically dominated by facultatively drought deciduous species such as California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*), and white sage (*Salvia apiana*). The community typically is found on low moisture-availability sites with steep, xeric slopes or clay rich soils that are slow to release stored water. These sites often include drier south- and west-facing slopes and occasionally north-facing slopes, where the community can act as a successional phase of chaparral development. DCSS intergrades at higher elevations with several types of chaparrals, or in drier more inland areas with Riversidean sage scrub. DCSS is found in coastal areas from Los Angeles County south into Baja California. This community is considered sensitive by the state of California resource agencies and a Tier II (Uncommon Upland) by the City of San Diego's Multiple Species Conservation Program.

On the Del Mar Preserve, this plant community is primarily dominated by California

sagebrush (*Artemisia californica*) or black sage (*Salvia mellifera*) on the western half. Most of the coastal sage scrub has been disturbed by agriculture, grazing, or fires. In the eastern part of the Preserve, coastal sage scrub grows on steep south-facing slopes in the context of the taller and denser chaparral communities. In these areas, black sage and common encelia (*Encelia californica*) with patches of California adolphia (*Adolphia californica*) characterize the coastal sage scrub. A small amount of the coastal sage scrub at the east end of the mesa included notable amounts of native grasses (*Nassella*

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Vegetation Communities (SANDAG, 1995)

- Diegan coastal sage scrub
- Chamise chaparral
- Scrub oak chaparral
- Southern maritime chaparral
- Southern willow scrub
- Southern mixed chaparral
- Non-native grassland
- Eucalyptus woodland
- Disturbed habitat

FIGURE 3-7
Vegetation on
Del Mar Mesa Preserve

pulchra, *N. lepida*, and *Melica imperfecta*); these areas were mapped as coastal sage scrub/valley needlegrass grassland.

Southern Mixed Chaparral

There are 259.3 acres of southern mixed chaparral on the Preserve. Southern mixed chaparral is a plant community typically dominated by broad-leaved sclerophyllous shrubs or small trees, and characteristically occupies protected north-facing and canyon slopes or ravines where more mesic conditions are present. Dominant shrubs in this community are typically 5 to 10 feet tall and may include manzanita (*Arctostaphylos* spp.), toyon (*Heteromeles arbutifolia*), ceanothus (*Ceanothus* spp.), mission manzanita (*Xylococcus bicolor*), and sugar bush (*Rhus ovata*). The vegetation is usually dense, with little or no understory cover, but may include patches of bare soil. This community typically is found in sites that are moister than those supporting chamise chaparral. Many species in this community are adapted to repeated fires by their ability to stump sprout. Southern mixed chaparral typically is found in coastal foothills of San Diego County and northern Baja California, usually at elevations below 3,000 feet. This community is considered a Tier IIIA (Common Upland) by the City of San Diego's Multiple Species Conservation Program.

Southern mixed chaparral is common in all but the southwestern portion of the Del Mar Preserve site. It is highly variable from patch to patch in stature, composition, and amount of disturbance present. The most common species in this community on-site is chamise (*Adenostoma fasciculatum*) and scrub oak (*Quercus dumosa*), laural sumac (*Malosma laurina*), and black sage (*Salvia mellifera*). There is a small area near the western edge of the property that consists of wart-stemmed ceanothus (*Ceanothus verrucosus*) and summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*) in the shaded regions of the drainages that support the southern mixed chaparral.

Southern Maritime Chaparral

Southern maritime chaparral makes up 39.0 acres of the vegetation on the Preserve. Southern maritime chaparral is a vegetation community that is comprised of a low growing, fairly open chaparral that grows along the coast and is influenced directly by the coastal climate. The plant community typically forms a mosaic of dense, impenetrable stands of vegetation intermixed with open areas. The plant species composition of southern maritime chaparral is similar to southern mixed chaparral. The presence of wart-stemmed ceanothus, Torrey pine (*Pinus torreyana*), and Del Mar sand aster (*Lessingia filaginifolia* var. *filaginifolia* [*Corethrogyne filaginifolia* var. *linifolia*]) in southern maritime chaparral distinguishes it from southern mixed chaparral. Southern maritime chaparral generally occurs at elevations below 3,000 feet and is restricted to sandy soils within the coastal fog belt and foothills in south Orange County, in San Diego County from Carlsbad to Point Loma, and in northern Baja California, Mexico (Hogan et al. 1996). This community is considered sensitive by state of California resource agencies and a Tier I (Rare Upland) by the City of San Diego's Multiple Species Conservation Program. Southern maritime chaparral is restricted to the south-central portion of the Del Mar Mesa Preserve. Other sensitive species within this plant community included coast barrel cactus (*Ferocactus viridescens*), ashy spike-moss (*Selaginella cinerascens*), and Del Mar Mesa sand aster (*Lessingia filaginifolia* var. *filaginifolia*).

Chamise Chaparral

Chamise chaparral is the most common type of chaparral community in southern California. Del Mar Mesa Preserve is dominated by this community, with 440 acres on the site. This plant community is dominated by chamise (*Adenostoma fasciculatum*), a shrub that is three to ten feet in height. Associated species contribute little cover and mature stands are densely

interwoven with very little herbaceous understory or litter. Chamise chaparral is often found on xeric slopes and ridges at low elevations. Granitic chamise chaparral is found in areas where the soil has a granitic base (Holland 1986). This habitat type is adapted to repeated fires by its ability to stump sprout. It is the predominant chaparral type in southern California, including areas such as Ventura, Los Angeles, San Bernardino, Riverside, and San Diego Counties. This community is considered a Tier IIIA (Common Upland) by the City of San Diego's Multiple Species Conservation Program (City of San Diego Biology Guidelines 2000a).

This plant community is found in several large patches mainly in the eastern half of the Preserve. In some of these areas, scrub oak and other species make up to 25 percent of the scrub cover.

Scrub Oak Chaparral

This community is the third largest on the site, totaling 103 acres. Scrub oak chaparral is a plant community dominated by a dense, evergreen chaparral that typically grows to 20 feet and is dominated by Nuttall's scrub oak (*Quercus dumosa*) with considerable Mountain mahogany (*Cercocarpus betuloides*). This chaparral community is somewhat more mesic than many chaparrals, and often occurs at slightly higher elevations of up to 5,000 feet. Substantial leaf litter accumulates in this habitat. Scrub oak chaparral occurs from the western Sierra foothills and North Coast range from Tehama County south through the southern California mountains and Baja California. Scrub oak chaparral occurs primarily on the bottom and lower slopes of drainages in the eastern half of the Preserve forming dense, nearly monotypic stands.

Non-Native Grassland

There are 5.9 acres of non-native grassland mapped on-site. Non-native grassland (NNGL) is a vegetation characterized by a dense to sparse cover of annual grasses reaching to three feet high, which may include numerous native wildflowers,

particularly in years of high rainfall. NNGLs contain species including, but not limited to, bromes (*Bromus* spp.), wild oat (*Avena* spp.), ryegrass (*Lolium* spp.), and fescues (*Vulpia* spp.). Typically, NNGL includes at least 50 percent cover of the entire herbaceous layer attributable to annual non-native grass species, although other plant species (native and non-native) may be intermixed (City of San Diego Biology Guidelines 2000a). These annuals germinate with the onset of the rainy season and set seeds in the late winter or spring. With a few exceptions, the plants are dead through the summer-fall dry season, persisting as seeds. NNGLs are usually found on fine-textured, usually clay soils, that range from being moist or waterlogged in the winter to being very dry during the summer and fall.

Typically, the plant community is found in valleys and foothills throughout most of California (except for the north coastal and desert regions) at elevations below 3,000 to 4,000 feet. This community is considered a Tier IIIB (Common Upland) by the City of San Diego's Multiple Species Conservation Program. (City of San Diego Biology Guidelines and Holland 1986).

Mostly human disturbance via agriculture has degraded the quality of native habitats throughout a large area of the western half portion of the Preserve. Annual grasslands on-site are dominated by slender wild oat (*Avena barbata*), foxtail chess (*Bromus madritensis* ssp. *rubens*), and smooth brome (*Bromus hordaceus*). Some of these grasslands are punctuated by individual shrubs like California sagebrush, laurel sumac, and coast goldenbush. This habitat provides limited value for most typical sage scrub wildlife species, and is void of sensitive plant species. However, it may provide valuable foraging habitat for raptors.

Vernal Pools

Vernal pools are shallow, isolated, ephemeral wetlands.



Photograph 3-12: Vernal Pool on the Portion of Del Mar Mesa Preserve Owned by CDFG. The microrelief surrounding vernal pools typically consists of small mima mounds or hummocks. Vernal pools fill with water during winter rains and the water evaporates after the rains cease. Plants in vernal pools may be aquatic or may germinate following the drying of the pool. San Diego mesa hardpan vernal pools have a characteristic suite of plant and animal species. Hardpan vernal pools are primarily found north of Otay Mesa (Holland 1986). Vernal pools are considered to be sensitive habitat by local, state, and federal governments, and it is estimated that over 95 percent of the vernal pool habitat in San Diego County has been destroyed.

Sensitive plant species associated with the vernal pools on Del Mar Mesa Preserve include San Diego button celery (*Eryngium aristulatum* var. *parishii*) and San Diego Mesa mint (*Pogogyne abramsii*). Sensitive animal species associated with vernal pool habitat include the two-striped garter snake (*Thamnophis hammondi*), western spadefoot (*Spea hammondi*), and San Diego fairy shrimp (*Branchinecta sandiegoensis*). Other sensitive species typically associated with vernal pools include California adder's-tongue (*Ophioglossum californicum*), Orcutt's brodiaea (*Brodiaea orcuttii*), and San Diego goldenstar (*Muilla clevelandii*). Numerous vernal pools are on Del Mar Mesa Preserve within areas mapped as chamise chaparral and southern mixed chaparral. Species dominating these pools are water starwort (*Callitriche marginata*), stone-crop (*Crassula aquatica*), woolly marbles (*Psilocarphus brevissimus*), and

grass poly (*Lythrum hyssopifolium*). Some of the larger and deeper pools are distinguished by spikerush (*Eleocharis* sp.). Smaller populations of California adder's tongue are present in some pools, and San Diego button-celery is common in many of the pools. San Diego mesa-mint is found in some of the pools as well. Downingia (*Downingia cuspidata*) and little mouse-tail (*Myosurus minimus* var. *filiformis*) are present in the southeastern pool complex.



Photograph 3-13: Vernal Pool on Property Owned by CDFG on Del Mar Mesa Preserve

Eucalyptus Woodland

There is a small patch of eucalyptus woodland on the southwest portion of the site, occupying 2.15 acres. This is a fairly widespread tree in southern California, typically forming monotypic stands of introduced, Australian eucalyptus trees (*Eucalyptus* spp.). The understory is usually depauperate or lacking from either shade or the toxic properties of the leaf litter. Eucalyptus woodlands are typically limited in value, serving only as nesting and perching sites for raptors. Stands of eucalyptus are distributed throughout the Preserve.



Photograph 3-14: Eucalyptus Woodland at Del Mar Mesa Preserve

Southern Willow Scrub

Southern willow scrub occupies only 0.17 acre on the Del Mar Mesa Preserve, in the far northeast corner. Southern willow scrub is considered a sensitive wetland habitat by CDFG and U.S. Army Corps of Engineers (USACE). Southern willow scrub is a dense riparian community dominated by broad-leaved, winter-deciduous trees such as willows (*Salix* spp.), and often scattered with Fremont cottonwoods (*Populus fremontii*) and western sycamores (*Platanus racemosa*). This plant community is typically found along major drainages but also occurs in smaller drainages. The density of the willows typically prevents a dense understory of smaller plants from growing. The representative species typically grow in loose, sandy, or fine gravelly alluvium deposited near stream channels during flood flows. This community requires repeated flooding to prevent succession to community dominated by western sycamores and Fremont cottonwoods (Holland 1986).

Disturbed Habitat

Disturbed habitat in this document refers to all dirt roads, graded areas, and other areas that lack vegetation. Approximately 15.7 acres in the southwest region of the Del Mar Mesa Preserve are considered disturbed.

b. Zoology

Del Mar Mesa Preserve supports a diversity of wildlife species. The diversity of animals observed and expected to occur in this area on the mesa is typical of relatively undisturbed native habitat in coastal San Diego County.

Wildlife species that have been observed at Del Mar Mesa Preserve are listed in Appendix 3f. Many other species probably occur on the Del Mar Mesa Preserve and may be encountered and documented during future monitoring and studies.

5. Sensitive Biological Resources

Sensitive biological resources on Del Mar Mesa Preserve are shown on Figure 3-8. The locations of some sensitive species observations during past surveys were not mapped though the species was documented as being present. These species should be monitored when funding becomes available. The City of San Diego has been monitoring some of the species discussed below (see Chapter 9), as required by the MSCP. When funding becomes available, it is recommended that future monitoring be done to determine the status of those sensitive species that are not being currently monitored.

a. Sensitive Plant Species on the Del Mar Mesa Preserve

Sensitive plant species observed on the Del Mar Mesa Preserve are listed in Appendix 3g. Those species covered by the MSCP (see Appendix 4) have specific management directives that are discussed in Chapter 9. Four species have been listed as either federally or state endangered/threatened on the Preserve. One federally endangered plant species, Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*), is present on-site. Three species on-site are both federally and state endangered:

San Diego button celery

(*Eryngium aristulatum* var. *parishii*)

Willow monardella

(*Monardella linoides* ssp. *viminea*)

San Diego mesa mint

(*Pogogyne abramsii*)

Eleven other species on the California Native Plant Society's List 1B and 2, considered eligible for state listing by CDFG and CEQA-significant, have been identified on-site:

San Diego sagewort

(*Artemisia palmeri*)

Orcutt's brodiaea

(*Brodiaea orcuttii*)

Summer holly

(Comarostaphylis diversifolia
ssp. diversifolia)
 Del Mar sand aster
(Lessingia filaginifolia var. *filaginifolia*
 = *Corethrogyne filaginifolia* var. *incana*)
 Coast barrel cactus
(Ferocactus viridescens)
 Sea dahlia
(Coreopsis maritima)
 Nuttall's scrub oak
(Quercus dumosa)
 San Diego goldenstar
(Muilla clevelandii)
 Wart-stemmed ceanothus
(Ceanothus verrucosus)
 Palmer's grappling hook
(Harpagonella palmeri var. *palmeri*)
 California adolphia
(Adolphia californica)
 Three other plant species considered by
 CNPS to have limited distribution (List 4
 and 3 species) are also found on-site:
 Western dichondra
(Dichondra occidentalis)
 California adder's-tongue fern
(Ophioglossum californicum)
 Little mouse-tail
(Myosurus minimus ssp. *apus*)

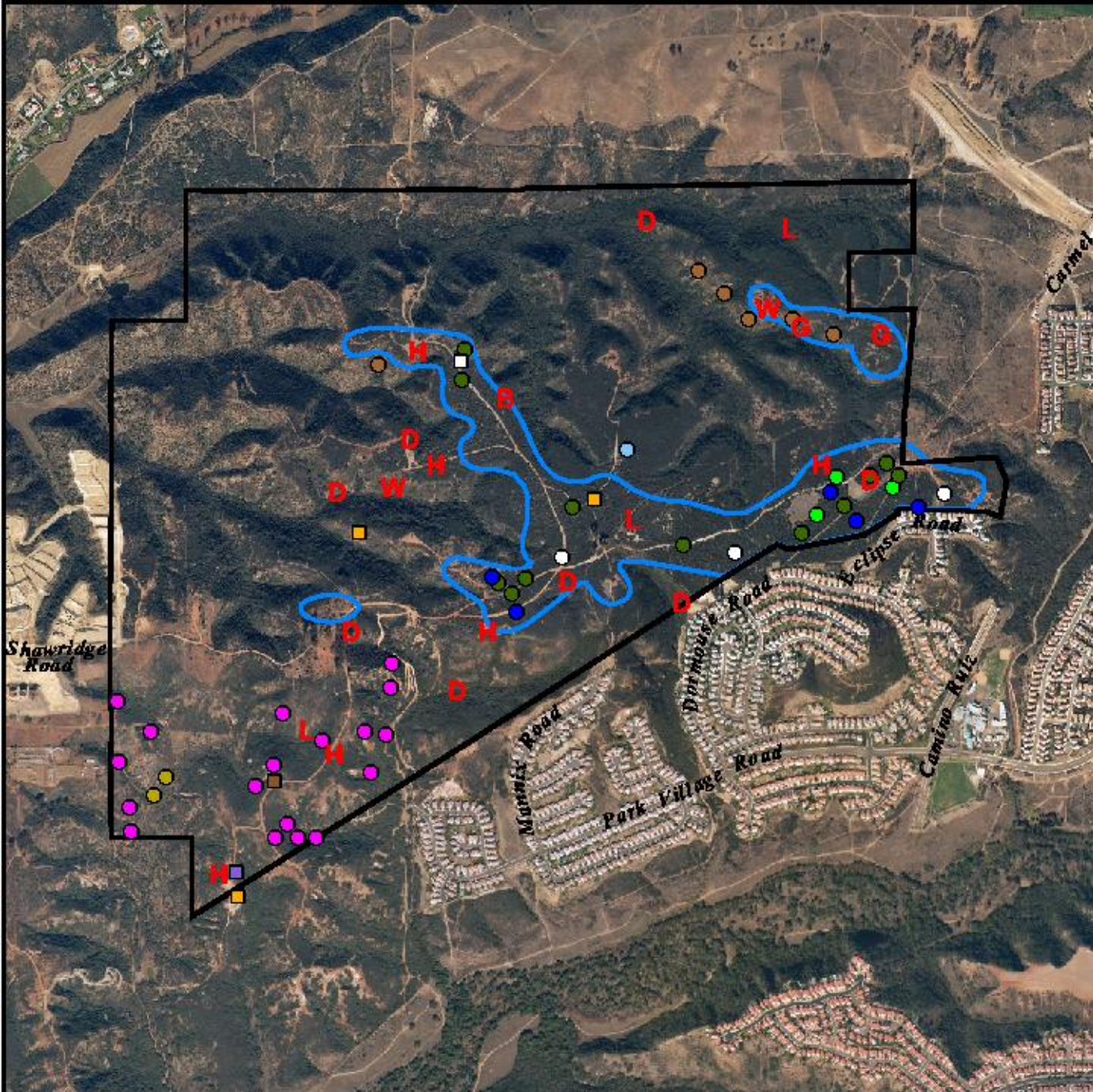
The sensitive plant species on the Del Mar Mesa Preserve are described below, with their status, as currently known, on the Preserve.

California adolphia (*Adolphia californica*). California adolphia is a CNPS List 2 species in the buckthorn family (Rhamnaceae). This species generally occurs in Diegan coastal sage scrub or near the edge of chaparral, in dry locales with shrubs four to five feet tall. This shrub flowers from December to April and loses its leaves in late summer and fall, making it difficult to find. Its spiny stems are identifiable at close range year-round, however. Its geographic range extends from San Diego County south into Baja California. In San Diego County, it is found from the Carlsbad area south into the Proctor Valley and Otay region (Beauchamp 1986). On the Del Mar Mesa Preserve California adolphia is a component of the coastal sage scrub and has been found in the

northeast portion of the Preserve and likely occurs at other locations as well. Surveys directed at locating the California adolphia, and monitoring its population on the Preserve should be instigated as funding becomes available.



Photograph 3-15: California Adolphia in the
 Northeast Portion of the Del Mar Mesa Preserve
Del Mar manzanita (*Arctostaphylos*
glandulosa ssp. *crassifolia*) is federally
 listed as an endangered species (USFWS
 1996) and is a covered species (Group A)
 under the MSCP (see Chapter 9 for species
 management directives). This shrub is in the
 heath family (Ericaceae), and can be
 distinguished from the common Eastwood
 manzanita (*A. glandulosa* ssp. *glandulosa*)
 by its shorter stature (to four feet) and by
 leaf and bract characters. This subspecies
 occurs in southern maritime chaparral on
 sandstone terraces and bluffs in central
 coastal San Diego, and in northern coastal



- Sensitive Plants**
(Source: City of San Diego (NDDB))
- *Arctostaphylos glandulosa* ssp. *crassifolia*
 - *Brodiaea orcuttii*
 - *Lessingia filaginifolia* var. *filaginifolia*
 - *Eryngium aristulatum* var. *parishii*
 - *Ferocactus viridescens*
 - *Myosurus minimus* ssp. *apus*
 - *Muhlia clevelandii*
 - *Pogogyne abramsii*

- Sensitive Plants**
(Source: Recon)
- *Adolphia californica*
 - *Comarostaphylis diversifolia* ssp. *diversifolia*
 - *Ferocactus viridescens*
 - *Muhlia clevelandii*

- Sensitive Animals**
(City of San Diego (NDDB))
- G Coastal California gnatcatcher
 - B Western bluebird
 - W Belding's orangethroat whiptail
 - H San Diego horned lizard
 - D Southern mule deer
 - L Mountain lion

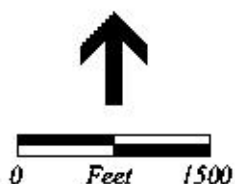


FIGURE 3-8
Sensitive Species on
Del Mar Mesa Preserve

Baja California. Urban expansion and clearing for agriculture have been responsible for most of the loss of this species. Del Mar manzanita is a component of the chaparral vegetation communities in the southwestern corner of the Del Mar Mesa Preserve (see Figure 3-8).

San Diego sagewort (*Artemisia palmeri*).

San Diego sagewort is a member of the plant family Asteraceae. This perennial is a County of San Diego Group A species and is on List 2 of the CNPS *Inventory* (Skinner and Pavlik 1994). It generally occurs in coastal sage scrub and along drainages in San Diego County and northern Baja California, Mexico. In San Diego County, its distribution ranges from La Jolla south to Otay and east to Alpine (Beauchamp 1986). This species can occur in low numbers in dense riparian vegetation and its presence may be very difficult to detect. It has been documented as occurring on Del Mar Mesa Preserve (see Appendix 3e), but its location has not been mapped. Searches for the species should be conducted as funding becomes available, and the species should be mapped.

Orcutt's brodiaea (*Brodiaea orcuttii*).

Orcutt's brodiaea is a CNPS List 1B species. Orcutt's brodiaea is considered sensitive by San Diego County and is included as a Group A species (see Chapter 9 for species management directives). It is found only in San Diego, Riverside, and Orange Counties and in Baja California, Mexico (Skinner and Pavlik 1994). This herbaceous perennial in the lily family (Liliaceae) sprouts from corms. Its preferred habitat in San Diego County is vernal moist grasslands, mima mound topography, vernal pools edges, and occasionally along stream banks. It is known to occur in clay, and sometimes serpentine, soils including Stockpen gravelly loam on Otay Mesa and Redding gravelly loam on Mira Mesa (Reiser 2001). Orcutt's brodiaea has been documented on mesas in the central and southeastern portions of the Del Mar Mesa Preserve (see Figure 3-8).

Wart-stemmed ceanothus (*Ceanothus verrucosus*). Wart-stemmed ceanothus is in the buckthorn family (Rhamnaceae). It is a

County of San Diego Group B species, an approved MSCP covered species (see Chapter 9 for species management directives) and a CNPS List 2 species. This large evergreen shrub occurs along coastal San Diego County and northern Baja California, Mexico (Reiser 1994). Wart-stemmed ceanothus is typically found on north-facing slopes as a component of southern mixed chaparral or southern maritime chaparral plant communities (Holland 1986). This species produces clusters of small white lilac-like flowers that appear between January and April. The small thick leaves and corky "warts" on the stem are characteristic of the species (Munz 1974). This plant is threatened by loss of habitat to development (Skinner and Pavlik 1994). Wart-stemmed ceanothus is a component of the southern maritime chaparral on the Del Mar Mesa Preserve; the southern maritime chaparral grows on canyon slopes and bottoms in the western half of the Preserve, and on the north-facing slopes of Deer Canyon that runs across the north end of the Preserve (see Figure 3-7).

Summer holly (*Comarostaphylis*

***diversifolia* ssp. *diversifolia*).** Summer holly is a CNPS List 1B species and a County of San Diego Group A species. This evergreen shrub in the heath family (Ericaceae) reaches heights of 15 feet and produces a small white flower from April to June (Munz 1974). Summer holly is found in the chaparral in Orange, Riverside and San Diego Counties, as well as Baja California, Mexico. In San Diego County it generally occurs at low elevations in chaparral communities near the coast. Summer holly is threatened by development and gravel mining (Skinner and Pavlik 1994). It has been documented on Del Mar Mesa Preserve (see Appendix 3e). Searches for the species should be conducted as funding becomes available, and the species should be mapped.

Western dichondra (*Dichondra*

***occidentalis*).** Western dichondra is a CNPS List 4 species, indicating that it has limited distribution or is infrequent throughout its range. Its range extends from Ventura County south into Baja California, including

the Channel Islands. In San Diego County it is known from Agua Hedionda south to Point Loma and inland to Poway, Otay Mountain, and the Tijuana Hills (Beauchamp 1986). This small perennial herb in the morning-glory family (Convolvulaceae) flowers from March to May. It often grows almost completely hidden under shrubs or trees in coastal sage scrub and chaparral, or among rocky outcrops in grasslands. It grows primarily in dry sandy soils such as Huerhuero soils and Hambright gravelly clay loam (Reiser 2001), but can occur in other soil types as well. The numbers of western dichondra are in a slow decline in southern California. Western dichondra has been documented as occurring on Del Mar Mesa Preserve (see Appendix 3e), but its location has not been mapped. Searches for the species should be conducted as funding becomes available, and the species should be mapped.

San Diego button-celery (*Eryngium aristulatum* var. *parishii*). San Diego button-celery is a member of the Apiaceae family. This annual/perennial herb is federally listed as endangered, state listed as endangered, and a CNPS List 1B species. It is also a covered species in the MSCP (see Chapter 9 for species management directives). San Diego button-celery is an annual/perennial species restricted in distribution to Riverside County, San Diego County, and Baja California, Mexico, where it occurs within coastal sage scrub, valley foothill grasslands, and vernal pools. San Diego button-celery grows in vernal pool areas in the north and south central, and the southeastern portion of the Del Mar Mesa Preserve (see Figure 3-8).

Coast barrel cactus (*Ferocactus viridescens*). Coast barrel cactus is a CNPS List 2 species and an MSCP covered species, San Diego County BMO Group B (see Chapter 9 for species management directives). This perennial stem succulent in the cactus family (Cactaceae) ranges coastally from San Diego County southward into northern Baja California. The preferred habitat for coast barrel cactus is on hillsides in Diegan coastal sage scrub, particularly

around rock outcrops or in cobbles on warm dry slopes with a southerly exposure. It is also found near vernal pools on Otay Mesa. It is associated with habitat (Stockpen gravelly clay loam, Miguel-Exchequer rocky silt loam, and Redding gravelly loam soils (Reiser 2001). Coast barrel cactus is threatened by urbanization, vehicles, and horticultural collecting. Coast barrel cactuses have been found on west- and south-facing slopes in the north central and the northeastern portions of the Del Mar Mesa Preserve.

Palmer's grappling hook (*Harpagonella palmeri*). Palmer's grappling hook is a member of the Boraginaceae family. This annual is a CNPS *Inventory* (Skinner and Payson 1994) List 2 species that occurs in Los Angeles, Orange, Riverside, and San Diego Counties as well as in Arizona; in Baja California, Mexico; and on San Clemente Island (Munz 1974). In San Diego County, it occurs on clay soils from Guajome Mesa, Rancho Santa Fe, Poway, Kearny Mesa, Mission Gorge, Rice Canyon, and Otay (Beauchamp 1986). Palmer's grappling hook has been documented during floral surveys on Del Mar Mesa Preserve (see Appendix 3e), but its location has not been mapped. Searches for the species should be conducted as funding becomes available, and the species should be mapped.

Del Mar sand aster (*Lessingia filaginifolia* var. *filaginifolia* [= *Corethrogyne filaginifolia* var. *linifolia*]). Del Mar sand aster is a CNPS List 1B species, with the highest rating for rarity, endangerment, and limited distribution (3-3-3) and is a covered species (Group A) under the MSCP (see Chapter 9 for species management directives). This perennial herb is a member of the sunflower family (Asteraceae) with gray-green leaves, violet ray flowers and yellow disk flowers that appear in summer. Del Mar sand aster is found in open coastal sage scrub and southern maritime chaparral on weathered sandstone-derived soils. It is endemic to San Diego County from Batiquitos Lagoon in Carlsbad, south to Del Mar Mesa, Carmel Mountain, and Torrey Pines State Park. Del Mar sand aster has

been mapped as occurring in the southwestern corner of the Del Mar Mesa Preserve (see Figure 3-8).

San Diego golden-star (*Muilla clevelandii*). San Diego golden-star is a member of the plant family Liliaceae. This herbaceous perennial is a MSCP covered species (see Chapter 9 for species management directives) and is on List 1B of the CNPS *Inventory* (Skinner and Pavlik 1994). San Diego golden-star is found only in southwestern San Diego County and northern Baja California, Mexico, where it occurs on clay soils in coastal sage scrub, chaparral, and grassland habitats (Munz 1974). It is a perennial bulb threatened by loss, degradation, and conversion of habitat. San Diego golden-star grows near vernal pools, though never within the inundation area of vernal pools, in the south central and southeastern portions of the Del Mar Mesa Preserve (see Figure 3-8).

Little mousetail (*Myosurus minimus* ssp. *apus*). This annual is on List 3 of the CNPS *Inventory*, indicating that additional study is needed to determine the level of threat to the species (Skinner and Pavlik 1994). It is an annual herb in the buttercup family (Ranunculaceae) that flowers from March to June. Little mousetail is endemic to vernal pools, where it typically grows in the deeper portions of vernal pools. It ranges from southern Oregon to northern Baja California, and can be found in the Central Valley and Riverside, San Bernardino, and San Diego Counties in California. In San Diego County, it is found in a limited number of vernal pools on Del Mar Mesa, Camp Pendleton, on Otay Mesa, near Otay Lake, near Peñasquitos Canyon, and in the Ramona area (Reiser 1994). Little mousetail is reported in a total of four vernal pools in two separate locations in the vicinity of Ramona Airport (State of California 2000).

California adder's-tongue fern (*Ophioglossum lusitanicum* ssp. *californicum*). California adder's tongue fern is a CNPS List 4 whose range extends from the Sierra Nevada foothills from Butte

to Merced County, to Monterey County, to San Diego, San Bernardino, and Orange Counties in southern California southward into Baja California, Mexico. In San Diego County, the fern has been reported from Kearny Mesa, Olivenhain, Proctor Valley, and Escondido (Beauchamp 1986). This perennial rhizomatous herb typically occurs on grassy slopes and near vernal pools and seeps, in coastal and foothill locations below 900 feet elevation. The California adder's tongue fern is easily observed during the springtime, but becomes inconspicuous later in the season. It has been documented as occurring on Del Mar Mesa Preserve (see Appendix 3e), but its location has not been mapped. Searches for the species should be conducted as funding becomes available, and the species should be mapped.

San Diego mesa mint (*Pogogyne abramsii*). This species is state and federally listed as endangered and is a CNPS *Inventory* (Skinner and Pavlik 1994) List 1B species. San Diego mesa mint is covered under the MSCP (see Chapter 9 for species management directives) and is considered a narrow endemic species.

San Diego mesa mint is a member of the Lamiaceae family. This annual herb flowers from April to June and is found only in vernal pools within San Diego County. San Diego mesa mint grows in the vernal pools where are located in the south central and southeastern portion of the Del Mar Mesa Preserve (see Figure 3-8).

Nuttall's scrub oak (*Quercus dumosa*). Nuttall's scrub oak is a member of the Fagaceae family. This evergreen shrub is a CNPS *Inventory* (Skinner and Pavlik 1994) List 1B species that occurs in Santa Barbara, Orange, and San Diego Counties as well as in Baja California, Mexico. Nuttall's scrub oak is found within scrub oak chaparral and southern maritime chaparral vegetation on sandy or clay loam soils. It has been documented as occurring on Del Mar Mesa Preserve (see Appendix 3e), but its location has not been mapped. Searches for the species should be conducted as funding becomes available, and the species should be mapped.

Ashy spike-moss (*Selaginella cinerascens*).

Ashy spike-moss is no longer considered a List 4 species by CNPS (State of California 2001a); however, due to the importance of this species to habitat and ecosystem stability, we still consider this species a sensitive resource. Ashy spike-moss is a prostrate perennial herb in the spike-moss family (Selaginellaceae) that reproduces by spores in March and does not bear flowers. It occurs in undisturbed coastal sage scrub and chaparral from Orange County south into Baja California. In San Diego County ashy spike-moss is most often found near the coast, south of Highway 78, particularly around the periphery of the city of San Diego. Ashy spike-moss has been documented as occurring on Del Mar Mesa Preserve (see Appendix 3e) and is present in many of the vegetation communities, particularly on flat mesas or slightly sloped mesa edges wherever the cryptogamic crust has not been disturbed and also in some locations that are recovering from disturbance. See Chapter 8 for further discussion of this species regarding management.

b. Sensitive Animal Species

Sensitive wildlife species that have been observed during the various studies on the Del Mar Mesa Preserve are listed in Appendix 3h. The species listed below which are covered by the MSCP (see Appendix 4 for complete list) have specific management directives that have been included in Chapter 9.

Invertebrates

San Diego fairy shrimp (*Branchinecta sandiegonensis*). The San Diego fairy shrimp is federally listed as endangered and is covered by the City of San Diego's MSCP (species management directives are included in Chapter 9), although no "take" is authorized under the City's permit. This species is restricted to vernal pools in coastal southern California and south to northwestern Baja California, Mexico (USFWS 2000). The life cycle of fairy shrimp is relatively simple, with larvae

hatching out of resting eggs after being covered with water for a prescribed period of time, developing into adults, and mating and laying eggs before the pool dries. The development time is influenced both by the water temperature and the species-specific responses to environmental cues. San Diego fairy shrimp are found in vernal pools that are generally less than 30 centimeters deep. This species takes between 3 and 8 days to hatch and development to the adult stage takes between 7 and 20 days. They are generally found in pools without other fairy shrimp but have been found with Lindahl's fairy shrimp (*Branchinecta lindahl*) and Riverside fairy shrimp (*Streptocephalus woottoni*). Recent incidental sightings of immature specimens were observed by RECON, with vernal pool complexes on the Preserve. Future surveys and monitoring of this species is recommended, when funding becomes available. See Chapter 8 for further details regarding its management.

Amphibians

Western spadefoot toad (*Spea hammondi*). The western spadefoot toad is a CDFG species of special concern. This species is found from central northern California through the coast ranges from San Francisco south into Baja California, Mexico (Stebbins 1985). The western spadefoot toad is primarily a species of the lowlands, frequenting washes, floodplains of rivers, alluvial fans, alkali flats, temporary ponds, and vernal pools. This species is generally found in areas of open vegetation with sandy or gravelly soil (Stebbins 1985). The main threat to the western spadefoot toad is believed to be habitat loss and fragmentation, although pesticide uses have been implicated as well. This species has been detected on the Preserve, but not mapped. Herpetofaunal monitoring on the Preserve has been implemented by the City of San Diego. These surveys will contribute in determining their current status.

Reptiles

San Diego horned lizard (*Phrynosoma coronatum blainvillii*). The San Diego

horned lizard is a CDFG species of special concern and an approved MSCP covered species (see Chapter 9 for species management directives). This lizard ranges from coastal southern California to the desert foothills and into Baja California. In Riverside County, the San Diego horned lizard occurs in the western half of the county east to the desert passes. It is often associated with coastal sage scrub, especially areas of level to gently sloping ground with well-drained loose or sandy soil (Mills 1991). This animal usually avoids dense vegetation, preferring 20 to 40 percent bare ground in its habitat. Populations along the coast and inland have been severely reduced by loss of habitat. Where it can be found, the San Diego horned lizard can be locally abundant, with densities near 20 adults per acre. They are largely dependent on harvester ants for food, which contributes to about half their diet. Adults are active from late March to late August; young are active from August to November or December. This species has been observed throughout the Preserve in chaparral habitat. Herpetofaunal monitoring on the Preserve has been implemented by the City of San Diego. These surveys will contribute in determining their current status.

Belding's orangethroat whiptail (*Cnemidophorus hyperythrusbeldingi*). The Belding's orangethroat whiptail is a CDFG species of special concern and an approved MSCP covered species (see Chapter 9 for species management directives). This species ranges from southwestern San Bernardino County to the tip of Baja California, Mexico, in areas of low, scattered brush and grass with loose sandy loam soils. It can be found in open coastal sage scrub, chaparral, washes, streamsides, and other sandy areas with rocks, patches of brush, and rocky hillsides (Stebbins 1985). The orangethroat whiptail feeds primarily on subterranean termites. It is active during the spring and summer months and hibernates during the fall and winter. Adult orangethroat whiptails generally hibernate from late July or early August until late April. The immature whiptail has a shorter

inactivity period, usually hibernating from December through March. Hibernation sites are on soft, well-drained slopes with southern exposure and little or no vegetation cover, and road cuts tend to be suitable. The orangethroat whiptail has declined within its range as a result of habitat loss and fragmentation (McGurty 1980). This species has been observed on the Preserve in chaparral habitat.

Herpetofaunal monitoring on the Preserve has been implemented by the City of San Diego. These surveys will contribute in determining their current status.

Two-striped garter snake (*Thamnophis hammondi*). The two-striped garter snake is a federal sensitive species that may grow as long as 36 inches though 18 to 24 inches is more usual. Its dorsal scales are keeled, which breaks up the reflection of light and results in a dull luster. The overall color is olive drab with a single yellowish stripe running down each side of the body.

Patterned into the dorsal coloration are four rows of small, dark spots. The belly is dull yellow, or sometimes salmon colored. The two-striped garter snake ranges in coastal California from the vicinity of Salinas south to El Rosario in Baja California. They are normally found in or near permanent fresh water, inhabiting streams, ponds, and lakes throughout their range. They are often found even in temporary bodies of water such as vernal pools. It is the most common snake in southern California, and it is not unusual to encounter several individuals at a time.

Activity is most common around dusk and in the early evening. Adults feed on frogs, tadpoles, toads, insect larvae, fish, fish eggs, and earthworms. The two-striped garter snake is ovoviviparous. Breeding commences in April and May and continues throughout the summer months. Gestation is approximately nine weeks. As many as 25 young may be born, though 12 to 13 is more common. Herpetofaunal monitoring on the Preserve has been implemented by the City of San Diego. These surveys will contribute in determining their current status.

Northern red diamond rattlesnake (*Crotalus exsul exsul*). The northern red

diamond rattlesnake is a CDFG species of special concern. This species occurs below 1,200 meters (4,000 feet) on both sides of the Peninsular Ranges of southwestern California in coastal sage scrub, desert scrub, open chaparral, woodland, and grassland habitats, as well as agricultural fields (Stebbins 1985). This snake is commonly found in areas with rock outcrops. Population declines in the red diamond rattlesnake are generally attributable to impacts related to the increased development near habitat in which this snake is found. Herpetofaunal monitoring on the Preserve has been implemented by the City of San Diego. These surveys will contribute in determining their current status.

Birds

Sharp-shinned hawk (*Accipiter striatus*)

The sharp-shinned hawk is a California species of special concern. It inhabits most of North America, in woodlands, parks, and residential areas. Breeding takes place in mountainous coniferous/deciduous forests, with nests usually within 90 meters of water (Zeiner et al. 1990). The proportion of birds in the sharp-shinned hawk's diet is the greatest of any of the hawks: they only rarely take small mammals, reptiles, etc. (Ehrlich, Dobkin, and Wheye 1988). Breeding occurs April through August. A common migrant and rare summer resident in San Diego County (Unitt 1984). Future surveys and monitoring of this species is recommended, when funding becomes available.

White-tailed kite (*Elanus leucurus*). The white-tailed kite is a California fully protected species that occurs in coastal lowland areas from Oregon to northern Baja California, Mexico (National Geographic Society 1983). This resident bird nests in riparian woodlands, live oaks, or sycamore groves which border grassland or open fields (Unitt 1984). The white-tailed kite forages over open areas and grasslands feeding primarily on small rodents and insects (National Geographic Society 1983). This species is known to roost in large communal

groups (Unitt 1984). White-tailed kite populations in southern California have declined due to the loss of nesting and foraging habitat. Future surveys and monitoring of this species is recommended, when funding becomes available.

Northern harrier (*Circus cyaneus*).

Northern harriers are a CDFG species of special concern, and nesting sites are considered sensitive by CDFG. This raptor is also an approved MSCP covered species (see Chapter 9 for species management directives). This species is a fairly common winter visitor and a formerly widespread breeder throughout California. The northern harrier hovers close to the ground while foraging in grasslands, agricultural fields, and coastal marshes. The northern harrier most commonly nests on the ground at the edge of marshes but will also nest on grasslands, in fields, or in areas of sparse shrubs (Zeiner et al. 1990). This species has been nearly eliminated as a nesting species in southern California because of disturbance and loss of suitable habitat (Small 1974). In San Diego County, northern harriers nest at Camp Pendleton and the Tijuana River (Unitt 1984). Future surveys and monitoring of this species is recommended, when funding becomes available.

Cooper's hawk (*Accipiter cooperii*). The Cooper's hawk is a CDFG species of special concern and is an approved MSCP covered species (see Chapter 9 for species management directives). Cooper's hawk ranges throughout most of the United States (National Geographic Society 1983). The Cooper's hawk is an uncommon migrant and winter visitor and rare summer resident in San Diego County (Unitt 1984). In San Diego County, this hawk mainly breeds in oak woodland and southern cottonwood-willow riparian habitats, but also will use eucalyptus trees (Unitt 1984). The Cooper's hawk forages primarily on songbirds but is also known to eat small mammals (National Geographic Society 1983). Although quantitative data is unavailable, Unitt (1984) speculates that breeding Cooper's hawks have declined in San Diego County as a

result of human disturbance related to urban and agricultural development. The breeding habitat in the project area is marginal for Cooper's hawks; however, there is a low to moderate potential for Cooper's hawk to forage over the project area. Future surveys and monitoring of this species is recommended, when funding becomes available.

California horned lark (*Eremophila alpestris actia*). The California horned lark is a CDFG species of special concern. The horned lark (*E. alpestris*) ranges throughout North America. However, the range of the California horned lark subspecies (*E. a. actia*) is along the coastal slopes of California from Sonoma County to San Diego County and includes most of the San Joaquin Valley (Grinnell and Miller 1944). Horned larks which occur in coastal San Diego County during the breeding season are members of this subspecies (*E. a. actia*), although other subspecies are found in San Diego County during the winter. In San Diego County, the California horned lark typically inhabits areas with sparse vegetation, including sandy shores, grasslands, mesas, and agricultural lands. Decline of this species is generally attributed to urbanization and human disturbance. Future surveys and monitoring of this species is recommended, when funding becomes available.

Coastal California gnatcatcher (*Poliioptila californica californica*). The coastal California gnatcatcher is federally listed as threatened, a CDFG species of special concern and a MSCP covered species (see Chapter 9 for species management directives). This resident species is strongly associated with coastal sage scrub vegetation. During dry months, the species will forage in adjacent riparian areas. Breeding territory sizes for gnatcatcher pairs have been found to vary from two acres to in excess of 40 acres. The coastal California gnatcatcher population in southern California has been reduced through loss of habitat to urban and agricultural development of the coastal slopes. This species has been observed in the past within

coastal sage scrub in the northeast corner of the preserve. Future surveys and monitoring of this species is recommended, when funding becomes available.

Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*). The southern California rufous-crowned sparrow is a CDFG species of special concern and a MSCP covered species (see Chapter 9 for species management directives). This resident bird ranges throughout coastal southern California, from Santa Barbara County south to San Diego County and into northwestern Baja California (Grinnell and Miller 1944). Nests are most often made on the ground. Habitat affiliations are coastal sage scrub, chaparral, and adjacent grassy areas (Unitt 1984). Insects are the primary food item of this species. Urbanization has decreased the amount of habitat suitable for southern California rufous-crowned sparrows. Future surveys and monitoring of this species is recommended, when funding becomes available.

Bell's sage sparrow (*Amphispiza belli belli*). Bell's sage sparrow is a CDFG species of special concern. Bell's sage sparrow is an uncommon to locally fairly common resident along the extreme west coast of California. Its breeding range is along the coastal slopes from Trinity County south into northwestern Baja California. Locally, it can be found in the interior chaparral and coastal sage scrub habitats, especially dense stands of chamise chaparral (Small 1974). This race is essentially sedentary. Male Bell's sage sparrows show high breeding territory tenacity, even when the habitat is altered dramatically (Ehrlich et al. 1988). This species feeds primarily on spiders, insects, and seeds while breeding, and seeds during the winter. Future surveys and monitoring of this species is recommended, when funding becomes available.

Mammals

San Diego black-tailed jackrabbit (*Lepus californicus bennettii*). The San Diego black-tailed jackrabbit is a CDFG species of

special concern (State of California 2001b). This species can be found throughout southern California, with the exception of the high-altitude mountains. The black-tailed jackrabbit is strictly herbivorous, preferring habitat with ample forage such as grasses and forbs. This species is most common in open habitats such as grasslands. The San Diego black-tailed jackrabbit breeds throughout the year with the greatest number of births occurring from April through May. This species is generally solitary, except when mating and raising young (Zeiner et al. 1990). This species has been detected on the Preserve during recent surveys by RECON.

Mountain lion (*Felis concolor*). The mountain lion is a California fully protected species and is covered by the MSCP (see Chapter 9 for species management directives). It has shown dramatic decline in southern California. Mountain lions are widespread but uncommon in California, ranging from sea level to alpine meadows. Mountain lions are most abundant in riparian and bushy habitats, as long as mule deer (their primary food source) are present. Home ranges for adult animals range from 8 to 40 square kilometers, which is larger for males and smaller for females. Numbers appear to be on the increase in California (Zeiner et al. 1990), but their main threat is human development, which leads to fragmentation of the habitat. As the habitat is fragmented, the movement of the lions is restricted which increases the associations with humans (Zeiner et al. 1990). Mountain lion has been observed on the Preserve in the past; its current status is not known. Future surveys and monitoring of this species is recommended, when funding becomes available.

Southern mule deer (*Odocoileus hemionus fuliginata*). The southern mule deer is an MSCP covered species (see Chapter 9 for species management directives). Mule deer inhabit a variety of plant communities, including coastal sage scrub, chaparral, grassland, woodland, and riparian systems. Distribution extends from Baja California into portions of San Diego, Orange,

Imperial, and West Riverside Counties. Adults' antlers may reach a four-foot spread. Mule deer primarily forage upon herbaceous plants, but will also eat various shrubs and trees (National Audubon Society 1991). Southern mule deer have been detected on the Preserve during recent surveys by RECON. It is presumed to be stable. Future surveys and monitoring of this species is recommended, when funding becomes available.

Chapter Four

Administration and Management Structure

A. Adaptive Management Approach

Because the Preserves are situated within urban San Diego, the involvement of the local citizens will enhance management. The Plan has been developed with an adaptive management strategy, one which allows management and monitoring tasks to be changed based on the results of previous work. Planning, acting, monitoring, and evaluating are the key elements in a continuous process where all the stakeholders interact. Communication and sharing information is the basis for adapting management and monitoring tasks to reflect what has been learned, thereby providing the best preserve management based on the most up-to-date monitoring and evaluation methods.

Broad goals of adaptive management are:

- 1) Improve the quality of decisions;
- 2) Reach decisions that enjoy increased public support;
- 3) Contribute to building long-term relations;
- 4) Incorporate citizens' ideas and knowledge in decisions; and
- 5) Learn, be innovative, and share results with others.

The adaptive management strategy is based upon a framework presented by Shindler et al. (1999).

Deriving natural resource management tasks is where science and policy come together. Natural resource managers must develop implementable methods of complying with existing mandates for conserving natural resources. Often policy moves faster than science, and the capacity of resource managers and scientists to provide information may require more time than policymakers are willing or able to accept (Clark et al. 1998). The natural resource managers for Carmel Mountain and Del Mar Mesa Preserves must rely on existing scientific information, or gather additional information quickly, so they can make sound decisions regarding ecosystem and sensitive species conservation.

Two perspectives about the role of science in integrating science and policy are required to implement the resource management tasks. One perspective emphasizes the traditional science of rigorous testing and evaluation with a sharp distinction between facts and values, and the other emphasizes the uncertainty of biology, the existence of multiple competing hypotheses, and collective learning (Clark et al. 1998). Organisms, vegetation communities, and ecosystems are variable and can change over time requiring an adaptive management strategy (Shindler et al. 1999) which may require this management plan to be updated. This strategy is the application of the second perspective, which may be supported by

scientific testing and evaluation. This management plan has been developed with the intent that it be useful for many years. In addition to applying science to implement ecosystem management policies, preserve managers must take into consideration the concerns of a wide variety of stakeholders whose goals are often disparate. To ensure that this management plan can be implemented and that it addresses all stakeholders' concerns, meetings were held where the City presented goals of natural resources management at Carmel Mountain and Del Mar Mesa and listened to the stakeholders' concerns. The meetings allowed the City to help lessen misunderstandings and opposition by the stakeholders and gave the City insight into the stakeholders' concerns.

B. Habitat Manager

The Preserves can be managed in a number of different ways. In each of the alternative management designs described in this section, a management committee with representatives from each of the agencies, jurisdictions, and other property owners would be formed and would provide oversight of the Habitat Manager. The Habitat Manager could be one person, one organization, or a committee. One Habitat Manager could oversee both the Preserves, or each Preserve could be managed by separate Habitat Managers. The method of managing one Preserve may be different than the method for the other.

1. Management Committee

The management committee would be the Habitat Manager. The committee would meet regularly and decide on management strategies. Each landowning agency, jurisdiction, or organization would be responsible for implementing the management strategies on their own properties.

2. Memorandum of Agreement (MOA)

In this design an MOA would be developed among the responsible parties. A management committee of agency, jurisdiction, and land owner representatives would be assembled to:

- a. Hire a Habitat Manager who would implement the management directives, or
- b. Assign one owner the primary responsibility to manage the Preserve(s) as the Habitat Manager under a cooperative agreement.

Each of these options would be directed and overseen by the management committee.

3. City of San Diego Open Space Manager

The management committee would defer to the City of San Diego to act as Habitat Manager of the Preserve(s) as part of their City of San Diego open space lands management program. Management would adhere to the MSCP requirements and the Carmel Mountain Preserve and Del Mar Mesa Preserve Management Plan. The City would coordinate all maintenance and management with funding from the City of San Diego open space management program and the other parties. The City would not provide management for The Environmental Trust (TET) owned lands until all bank credits are sold in accordance with the bank agreement.

4. Non-profit Land Trust

The management committee could decide to assign the management of the Preserve(s) to a non-profit land trust who would be the Habitat Manager. The agencies, jurisdictions, and other land owning organizations would still oversee the management of their own lands to meet their own goals and requirements.

C. Constraints and Opportunities

1. Opportunities

Options for managing the Preserves vary in scale, cost, and effort to achieve. It is anticipated that numerous strategies will be employed in a multifaceted approach. Some examples of the varied conservation opportunities on Carmel Mountain and Del Mar Mesa Preserves are as follows:

a. Maintain and Manage the Existing Preserve System

A preserve system has been established that serves as the core upon which to expand.

b. Expand and Enhance the Existing Preserves

Opportunities exist to expand the boundaries of the existing Preserves by purchase of land, land swapping, and land donations.

c. Custom Design Appropriate Management Strategies

This management plan provides specific management policies, direction, and actions for the two Preserves to improve conditions for existing sensitive species, establish conditions that will support the introduction or reintroduction of other native species, and address other issues such as those associated with non-native and invasive species. Management needs to be adaptive to changing conditions of ecosystems, species viability, level of stress, and many other factors. Ongoing examples are the changing, or evolving, policies of land and wildlife management agencies with regard to their stances on invasive versus native species and wildfire management.

2. Constraints

Constraints are equally as important as the opportunities and are an inherent and useful tool in identifying the various strategies for implementing this plan. Many of the constraints represent factors that we have no

control over, yet have an influence on the Preserves. The following are examples of the many factors that should be considered and evaluated in the adaptive management of the Preserves.

a. Level of Species-Specific Information

This is critical to making informed decisions during the management process. Adequate knowledge about the status, life history, distribution, and habitat requirements of plants and animals is essential and oftentimes lacking.

b. Existing and Future Actions or Landscape Elements that may Pose Impacts to Sensitive Species

Land use, water use, transportation elements, and utility corridors all have implications as potential threats and stressors to sensitive, vulnerable species, and their habitats.

c. Land Use Conflicts Within Biological Significant Areas

Existing or future land uses may conflict with the needs of native species in some areas.

d. Conflicting Needs of Different, Equally Important Species

There may be areas where two or more sensitive species exist in the same ecosystem competing for food sources or with conflicting needs for other habitat elements.

e. Costs of Land, Expertise, and Improved Data

Cost is a significant determinant in the reserve implementation and management.

f. Land Management Policies and Practices

How the Preserves are managed, in part or as a whole, will be critical to their long-term survivability. The land management stakeholders—local, state, and federal agencies as well as private parties—will be challenged to define and refine management policies and practices to best meet their goals and the goals of the management plan. Realistic limitations must be considered while identifying new sources of funding in both the short term and the long term.

g. Current and Future Agency and Jurisdiction Staffing Levels and Budgets

Agencies' and jurisdictions' staffing levels and budgets will need to be reviewed to determine their adequacy in light of the potential for increased management, maintenance, and monitoring responsibilities.

h. Changes Over Time

The fact that landscapes are dynamic needs to be considered in the implementation of this plan to ensure appropriate adjustment of management and monitoring strategies. Because of their inherent dichotomy, the conservation opportunities and constraints can be viewed as opposing and *at the same time* complementary elements of the preserve management process. Viewing the level of current conservation status of lands shows us at the same time the areas outside of protection. Conversely, identifying the ecosystems that are most threatened by current and future actions shows us the areas most in need of protective measures and conservation.

D. Maintenance, Usage, and Development Guidelines

Carmel Mountain and Del Mar Mesa Preserves will be open to the public. In addition, utility easements and facilities need regular maintenance and improvement. The following guidelines are provided for public safety and for protection of native habitat and wildlife while preserving the natural park experience for everyone. If any maintenance activity adversely impacts natural or cultural resources, mitigation will be required in accordance with the City of San Diego Biology Guidelines and any other applicable regulations. Table 4-1 offers an implementation schedule for maintenance projects on the Preserves.

1. Utilities

a. Utilities on Carmel Mountain Preserve

A 150-foot-wide San Diego Gas & Electric (SDG&E) easement runs north to south along the western side of the Carmel Mountain Preserve (see Figure 5-1 in Chapter 5, Trails) and encompasses about eight acres. The easement accommodates 138-kilovolt and 230-kilovolt high-tension overhead transmission lines, a 30-inch high-pressure gas line, and 10- and 16-inch fuel lines.

b. Utilities on Del Mar Mesa Preserve

The Del Mar Mesa Preserve also contains SDG&E access roads to their transmission towers on-site (see Figure 5-2 in Chapter 5, Trails).

c. Utilities Operation and Maintenance at the Preserves

SDG&E has developed a Subregional Natural Community Conservation Plan

(SDG&E 1995) designed to provide long-

Draft

**TABLE 4-1
PRESERVE MAINTENANCE SCHEDULE**

Task	Schedule
Restroom cleaning (if they are installed)	Once a day.
Litter control	Twice a week in parking lots and picnic areas; annual cleanup in other areas; and special volunteer projects for litter and illegal encampment removal as needed.
Illegally dumped material removal	As soon as possible where needed.
Manure removal from equestrian trails and parking lots	As soon as possible where needed.
Graffiti removal	As soon as possible from preserve facilities.
Maintenance and installation of gates, chains, and locks	As needed to prevent illegal entrance (coordinate with SDG&E, agencies, private landowners, and other entities that may need access).
Sign replacement, repair, and cleaning	As needed.
Picnic areas vegetation maintenance if picnic areas are designated at the preserves – flail, mow, and weed to prevent fire and safety hazards	In the spring after native plants go to seed (April - June).
Safety hazard removal (such as fallen trees or hanging shrub limbs along the trails)	Remove and place as needed.
Improper or illegal public activity removal (such as transient encampments; private encroachments on public land; tree houses, swings, or ropes in trees)	As needed.
Exotic, nonnative plant removal	As and where needed, by City staff or volunteers trained or supervised by City staff. Coordination with other agencies conducting similar activities in the area is desirable for optimum effectiveness.
Brush removal and thinning within 100 feet from structures within preserves, per City of San Diego Municipal Code 142.0412 to address Category I fire hazards	As need based on an annual evaluation.
Trail maintenance	Major repairs once a year after the end of the rainy season; minor repairs throughout the year as needed.
Hazardous material removal	When identified, hazardous materials should be removed per approved procedures. Contact the City of San Diego Environmental Services Department hazardous materials team for details.
Parking lot maintenance	Parking areas maintained and repaired once a year after rainy season.
Sewer line and access road service (City of San Diego Metropolitan Wastewater Department), if they are installed at the preserves – service manholes, monitor and maintain sewer lines and access roads	Once a year. Emergency repairs should be conducted as soon as possible.
Power line and right-of-way maintenance (San Diego Gas and Electric)	General maintenance once a year. Emergency repairs as soon as possible.

term conservation of habitats and species while allowing SDG&E to develop, install, maintain, operate, repair, and replace facilities on public and private land within the subregional plan area, including land set aside for the protection of plants and animals.

The Carmel Mountain and Del Mar Mesa Preserves are within the MHPA as designated by the MSCP. Implementation of SDG&E's Subregional NCCP is independent of the MSCP and other plans. Therefore, SDG&E may conduct necessary operations, maintenance, repair, and replacement activities for all facilities that are or may be located within the preserve, provided the activities are conducted in accordance with the Subregional NCCP. However, many projects will require CEQA and National Environmental Policy Act (NEPA) review, such as projects that are subject to permits from the California Public Utilities Commission, Coastal Commission, Energy Commission, State Lands Commission, and several other state and federal agencies.

According to the SDG&E Subregional Plan, the short-leaved dudleya is adequately conserved by the Subregional Plan because impacts will be avoided unless deemed necessary for emergencies or repairs. If impacts are unavoidable, state of the art conservation practices will be used to determine the best impact minimization and mitigation method consistent with SDG&E operational protocols. If repairs to existing facilities could result in an impact to short-leaved dudleya or other narrow endemic species, a biologist would be consulted.. Pursuant to SDG&E's NCCP, narrow endemic species may not be impacted for non-emergency work without SDG&E conferring with the USFWS and CDFG. For new projects, kill or injury of narrow endemic animal species or destruction of such plants or their supporting habitat would not be covered by the Subregional Plan and the associated Implementing Agreement. See Sections 7.1 and 7.2 of the Subregional Plan for operational protocols and habitat enhancement measures.

The following guidelines pertain to utility maintenance on both preserves:

1. Applicable city, state, or federal permits will be required prior to conducting any maintenance activity. Additionally, all such activity will comply with guidelines in this management plan. Approval from the City of San Diego is required for all maintenance activity design, implementation, and mitigation to ensure the guidelines in this management plan are being incorporated.
2. Necessary underground public facilities are permitted to cross City open space areas if no permanent damage is sustained (San Diego City Council Policy 700-17). Revegetation would be required, as well as any other required mitigation outlined in appropriate permits.
3. A Memorandum of Understanding or Letter of Agreement with each utility which conducts maintenance activities within the Carmel Mountain and Del Mar Mesa preserves should be developed to outline specific conditions for maintenance of their facilities and easements.
4. All SDG&E and City work crews must have undergone training programs to make crews alert to the sensitivity of the habitats in which they are working. The City of San Diego and SDG&E have training programs for crews working in environmentally sensitive areas, as well as a sensitive plant, animal, and habitat reference guide. Crews should be routinely trained and advised on how to minimize environmental impacts during maintenance activities.
5. Maintenance activities and other uses of easements held by SDG&E must be coordinated with a Park Ranger, who shall in turn notify, if necessary, the Habitat Manager. Notification of appropriate City of San Diego personnel should also occur as soon as possible when emergency action is required.
6. If a maintenance activity could result in direct or indirect impacts to surrounding

- habitat or sensitive resources, the maintenance work area should be coned or flagged by a Park Ranger, Natural Resource Planner, or qualified biologist or archaeologist to aid the maintenance personnel in keeping the impact confined to the work area.
7. Prior to conducting any maintenance activity that disturbs substrate, a site check for archaeological resources shall be conducted by a qualified archaeologist. Results should be given to the City of San Diego (Contact: Park Ranger or Natural Resource Planner for review by Development Services archaeologist) and the landowner, if applicable, for review and evaluation. If the potential for indirect impacts exist, the site shall be flagged to keep work crews away. If direct impacts are found to be likely, the project should: (1) try to avoid the area; (2) minimize the impact; and (3) develop and implement a plan for recovery of resources subject to approval by the City contacts provided earlier. Native American consultation should be made, when appropriate, during impact analysis and mitigation design and implementation. A stewardship program for prehistoric and historic resources should be instituted for the Preserves in conjunction with the information outlined in the Cultural Resources section of this document. A designated steward would then be involved in consultations about projects and possible impacts to cultural sites.
 8. Regular maintenance activity and new construction should avoid nesting/breeding season of sensitive species (approximately February - September).
 9. If work crews find an unidentified, potentially sensitive plant, nest, or burrow in the maintenance area, the Project Biologist will be contacted. The Project Biologist will determine appropriate action to avoid or minimize impacts prior to resuming work.
 10. Utility easements and siting of access roads should be reviewed to identify changes which could be made to minimize erosion and the impact on sensitive areas and species, cultural sites, wetlands, and aesthetic values. No activity should increase the size of existing access roads. If re-routing of access roads occurs, the vacated area(s) should be available for sensitive plant/habitat restoration.
 11. Parking or driving under all large native trees, especially oak trees, is not permitted in order to protect tree root system.
 12. Stream crossings by vehicles shall be minimized and limited to previously designated crossing locations to reduce water quality impacts.
 13. All construction and maintenance materials will be disposed of in an appropriate manner and not in or near wetlands.
 14. All construction and maintenance activities should use best management practices, for erosion control at construction/work site and should provide for park user safety, such as temporary signs and/or barricades.
 15. Erosion on access roads will be minimized using appropriate measures, such as water bars.
 16. For all grading work, dust will be controlled with regular watering.
 17. Mowing, rather than grading, should be the method of revegetation removal if needed to eliminate/reduce fire hazard, to provide safe access, or to improve view of utility facility. Additional guidelines for SDG&E maintenance activities include:
 - Maintenance activities shall avoid being conducted during the rainy season when soils are wet;
 - All vehicles, personnel, and equipment shall remain within the existing right-of-way;

- Any accidental damage to habitat on the Preserves outside the right-of-way shall be mitigated per the “Subregional Natural Community Conservation Plan” (NCCP) (1995) as outlined in the SDG&E NCCP. The NCCP requires projects go through a mitigation process for direct and indirect impacts. Forms of acceptable mitigation, in order of preference, include avoidance; on-site mitigation; fee-owned easements dedicated to the MSCP; and credits from pre-approved mitigation banks; and SDG&E shall conduct all operations within the Preserves according to “Operational Protocols” outlined in their NCCP. This NCCP serves as a 50-year permit with USFWS and CDFG and meets the requirements for the federal and state endangered species acts for 25 years, with an option for renewal up to 50 years.

2. Preserve Maintenance

The following guidelines address several issues that pertain to maintenance activities for both Preserves:

- If required, all applicable city, state, and/or federal permits shall be obtained prior to conducting any maintenance activity. Additionally, proposed maintenance activity shall comply with guidelines in this management plan.
- If a maintenance activity should result in direct or indirect impacts to surrounding habitat or sensitive resources, the maintenance area should be coned or flagged by a Park Ranger, Natural Resource Planner, or qualified biologist and/or archaeologist to aid the maintenance personnel in keeping the impact confined to the work area.
- Prior to conducting any maintenance activity that disturbs substrate, a site check for archaeological resources shall be conducted by a qualified archaeologist. Results shall be given to the City of San Diego (Contact: Park Ranger or Natural Resource Planner for review by Development Services archaeologist) and the land owner, if applicable, for review and evaluation. If the potential for indirect impacts exist, the site shall be flagged to keep work crews away. If direct impacts are found to be likely, the project should: 1) try to avoid the area; 2) minimize the impact; and 3) develop and implement a plan for recovery of resources subject to approval by the City contacts provided earlier. Native American consultation should be made, when appropriate, during impact analysis and mitigation design and implementation. A stewardship program for prehistoric and historic resources should be instituted for the Preserves in conjunction with the information outlined in the Cultural Resources section of this document. A designated steward would then be involved in consultations about projects and possible impacts to cultural sites.
- Access should be maintained for emergency and maintenance vehicles (including SDG&E). Road maintenance should be limited to clearing or thinning brush and smoothing the road surface within the existing roadway.
- All road repair and maintenance activity should be confined to the roads and easements themselves. Work should be planned and coordinated with appropriate personnel and agencies in advance to ensure no impacts occur to known sensitive biological and archaeological resources.
- Whenever possible, maintenance and/or patrol vehicle activity should be minimized within the preserves when soils are wet to avoid degradation of trails.
- All fences and gates will be kept in good repair and, when necessary, promptly replaced.
- All maintenance activities should use best management practices for erosion control at the work site.

9. Trail (hiking, bicycling, and equestrian) maintenance will be initiated based on Park Ranger inspection and coordinated with biologist and/or archaeologist, as necessary.
10. Trails closures should be instituted to: allow native vegetation to recover; facilitate wildlife movement; protect archaeological sites and biological sensitive species or areas; allow added protection for sensitive species during breeding season; provide erosion control; ensure public safety; and allow for trail maintenance. Such closures may be temporary or permanent depending on the need.
11. Existing and proposed trails will be regularly evaluated by a qualified biologist and/or Park Ranger for impacts with consideration given to erodibility of soils and to sensitive species/habitat in the vicinity.
12. Fencing of trails may be needed to keep people on the trails and out of sensitive areas.
13. Refurbish existing trails and relocate, if necessary, to avoid environmentally sensitive areas.
14. Poison oak, stinging nettle, and other native human nuisance plant species should be controlled only around highly used public areas, such as trails, parking lots, historic points of interest, and interpretive displays. In other areas they should be allowed to remain as part of the natural system.
15. Equestrian trails need to be cleaned frequently using manual, not mechanical, methods by City forces.
16. Brush management activities (fire breaks, brush thinning) should be done in accordance with City of San Diego Development Services Department regulations. Brush management actions are exempt from mitigation requirements in this document as long as sensitive habitats and species are avoided and guidelines in the City of San Diego MSCP Subarea Plan is followed.
17. Wildlife corridors shall be kept free of debris, trash, homeless encampments, and other obstructions to wildlife movement.
18. Any wildlife crossing should be screened on both sides of the crossing between the crossing and adjacent land uses.
19. The potential release of toxic or extraneous materials should be monitored and enforcement action taken as necessary.
20. Affected land owners within the preserves should be contacted prior to any maintenance activities. Any additional regulatory requirements should be implemented as required by the affected land owners (e.g. U.S. Fish and Wildlife Service Refuge requirements).

3. Public Use

The following guidelines pertain to the use of the Preserves, which will be open to the Public:

1. All trail users should remain on designated trails for protection of adjacent sensitive resources and for their personal safety. Signs should be used to direct public use to appropriate, designated trails.
2. Horseback riding, hiking, and bicycling are allowed on designated trails only. Signs shall be installed to identify appropriate uses for designated trails. All undesignated trails are closed to Park users.
3. Domestic animals shall be on a leash at all times within the Carmel Mountain and Del Mar Mesa preserve areas and will remain on service roads and in public areas.
4. All litter should be placed in garbage cans placed at trail heads and other locations within the preserves. Trash receptacles should be emptied on a regular basis.
5. Park rangers shall enforce state law, city ordinances, and the policies within this management plan. In addition, U.S. Fish and Wildlife Service Refuge

policies shall be enforced within lands owned by U.S. Fish and Wildlife Service.

6. Regular patrols to identify and control vandalism, off-road-vehicle activity, poaching, and illegal encampments shall be conducted.
7. Subsequent to completion of a Notice to Vacate and in accordance with applicable codes, any encampments found shall be removed as soon as possible after consideration of biological concerns.
8. No unauthorized motorized vehicles, except emergency vehicles, preserve managers, Park Rangers, or maintenance personnel (including SDG&E) shall be allowed on any trails within the preserve. No off trail use is allowed within the preserves.
9. Graffiti and other effects of vandalism shall be removed/repainted, within 24 to 48 hours.
10. A reporting and enforcement procedure should be developed to prevent residential or landscape encroachment into the Preserves.
11. Areas where dumping occurs should be checked regularly and barricaded, if deemed necessary, to discourage dumping.
12. Any identified hazardous waste shall be removed as soon as possible following appropriate hazardous waste material disposal guidelines. Areas should be signed within 24 hours of identification of the problem to indicate the presence of hazardous materials and made off-limits to public use.

4. Restoration/ Revegetation of Habitats

Existing disturbed areas and future disturbances may warrant restoration or revegetation, as determined by the Habitat Manager and the oversight committee. Should future revegetation be warranted, a revegetation plan would be proposed by the Habitat Manager in the yearly work plan, for

approval by the appropriate landowner or designee. Recommendations for restoration and enhancement within the Preserves are discussed in Chapter 8, Habitat Management and Maintenance.

5. Monitoring of Biological Resources and Revegetation Sites

Monitoring is introduced here and discussed in more detail in Chapter 8 (Habitat Management and Maintenance) that describes habitat restoration, and Chapter 9 (Management and Monitoring of Sensitive Resources). Should the need for revegetation within the Preserves arise, a monitoring plan would be proposed by the Habitat Manager in conjunction with the revegetation plan, for approval by appropriate landowner or designee.

6. Native Species Introduction

A species extirpated from the Carmel Mountain or Del Mar Preserve areas may be reintroduced into the Preserves. Any introductions are subject to the prior consensus of the City of San Diego, the Habitat Manager, the agency with jurisdiction over that species, and any private landowners that may be affected. Introductions must be evaluated with respect to feasibility and the availability of suitable habitat. Only native species whose historic range included the project site may be introduced.

7. Prevention of Degradation

a. Encroachment (New Development, Additional Clearing)

Within the Preserves, the following shall be prohibited:

- Grading, except for habitat or species restoration or if trails may need to be

redirected around sensitive habitat or species to avoid impacts.

- Excavation, except for vernal pool restoration.
- Placement of soil, sand, rock, gravel, or any other material, except for habitat or species restoration.
- Clearing of vegetation, except for removal of exotic plant species.
- Construction, erection, or placement of any building or structure. Exceptions may include possible erection of restrooms, kiosks, a visitor center, and other interpretive structures to be determined in the future.
- Unauthorized vehicular activities.
- Trash or hazardous waste dumping.
- Use for any purpose other than designated in this Management Plan.

The Habitat Manager, in consultation with interested parties, should determine the appropriateness of any proposed uses not designated in this management plan. To limit impacts to the preserves, activities are restricted to:

- Wildlife monitoring surveys conducted as part of the annual status reviews.
- Emergency response by the Habitat Manager and the appropriate agencies in case of fires, floods, earthquakes, or other natural disasters.
- Vehicle access to the power transmission lines at the western edge of the Carmel Mountain Preserve for transmission line maintenance.
- Hiking, biking, and equestrian activities on the designated hiking/biking/equestrian trails.

All activities on the Preserves will be conducted in accordance with the applicable impact avoidance and reduction measures identified herein:

- All activities authorized by the Habitat Manager must be conducted to avoid take of listed species or must be covered by their own permits.
- All activities authorized by the Habitat Manager must be consistent with the goals and objectives of the MSCP.

b. Exotics

Exotic Plant Species

The introduction of exotic species is the chief cause of habitat degradation near developed areas. Both animal and plant species can cause significant problems.

Control of exotic plant species will include:

- Monitoring of habitat within the open space for occurrence of exotic plant species.
- Removal of existing exotic species using manual methods as needed.
- Prevention or minimization of the introduction of exotic plants. The City of San Diego Landscape Guidelines prohibit the purchase and planting of any exotic plant species. The plants identified on the California Exotic Pest Plant Council List (Appendix 5) should be prohibited from being planted or introduced in any way to the Preserves and should be removed if found. The Habitat Manager shall supply the table to the Habitat Management District and the local project developers and homeowners associations. The Habitat Manager shall add plants to this list of exotics if it can be shown the species is having a negative impact on the Preserves.
- Removal of all new infestations promptly following their discovery. This is the responsibility of the Habitat Manager.

Perennial and biennial exotic plant species removal and control will consist of cutting weed stems off below ground level or pulling weeds manually. Annual weeds will be manually or mechanically (i.e., mowed) cut prior to producing ripe seed. Cut or pulled weeds will be disposed of properly. Use of herbicides for weed control will be allowed at the discretion of the Habitat Manager.

With the use of herbicides:

- The herbicides should be biodegradable.
- The minimum amount required to be effective will be used.

- Applications need to be done at the appropriate time of year to maximize efficiency.
 - Applications must be focused on the target species, avoiding impacts to native vegetation.
 - Areas treated shall be posted with signs warning of the presence of herbicides.
- Pesticide application would be consistent with city, county, state, and federal guidelines. All applications must avoid take of listed species. The Habitat Manager is responsible for all the necessary permitting required for exotic plant species removal. Each year, the Habitat Manager will assess the occurrence of perennial and biennial weeds in the open space and prepare a weed control plan. In the plan, the Habitat Manager will identify problem areas, prescribe the measures to be implemented, prioritize the order in which problem areas are managed, and set a schedule for the recommended actions. Reassessment of the open space for exotic species problems will occur every year, at the time of the annual review.

Exotic Animals

Exotic animals typically present a much more difficult control problem than do exotic plants. There is a potential for the Argentinean ant (*Iridomyrmex humilis*) to occur within the proposed open space. Cats and dogs from adjacent developments are expected to enter the Preserve.

- Monitoring for the occurrence of Argentinean ants and imported fire ants and implementation of control measures that are based on methods prescribed by County and state agencies and approved by the Habitat Manager will occur. Removal of trash, an unwanted food source, and control of runoff from outside the Preserves and excess water inside the Preserves, will help discourage establishment of Argentinean ants, which displace native ants, the main prey of the San Diego horned lizard. The use of pesticides is discouraged on the Preserves. If deemed necessary by

the Habitat Manager, pesticides are to be used at the discretion of the Habitat Manager, who shall be responsible for any permits per city, county, state and federal guidelines.

An unfortunate inclusion to the exotic species group is uncontrolled pets. Dogs and cats can be major predators on native species. Steps shall be taken to prevent the predation of native species by dogs, cats, and other non-native predators.

Predator control should be initiated as necessary on a case-by-case basis and as funding permits. The following are specific guidelines for predator control:

- Trapping of non-native predators should be limited to strategic locations where determined feasible to protect ground and shrub-nesting birds, lizards, and other sensitive species from excessive predation.
- Predator control should be considered to be a temporary, short-term activity.
- A predator control program should only be implemented to address a significant problem that has been identified and is needed to maintain balance of wildlife within the preserves.
- Predator control methods shall be humane. Adequate shade and water should be provided and traps should be checked twice daily.
- If a predator control program becomes necessary, signs at access points should be installed to notify adjacent residents that trapping will occur and how to retrieve their pets.
- Any domestic animal inadvertently trapped should be taken to the nearest animal shelter.
- Any predator control activities should be coordinated with MSCP staff to ensure that the activity is in compliance with MSCP regulations.
- The Habitat Manager shall promote education of the open space users (those using the hiking/equestrian trail) to the potential impacts of uncontrolled pets, using signs posted at the trailhead locations.

- Leash laws shall be enforced within the preserves in order to control pets.
- The Habitat Manager shall report to the County Animal Control Officers if persistent and chronic problems in the open space from particular uncontrolled pets occur.

Eradication and control efforts shall be done at the most effective and efficient time of year, and these efforts shall reflect the latest information in the field on control of the target species.

If any non-native predators are observed within the preserve area (i.e., cowbirds, feral cats, etc.), it should be reported as soon as possible to senior park staff and MSCP staff. A qualified biologist should verify any observations by unqualified staff or the public. If funding is available, the ranger should begin predator control at that location in accordance with the guidelines given above.

8. Trail Maintenance

Trail maintenance is described in detail in Chapter 5.

9. Public Awareness

The long-term success of the Preserves and the concept of habitat protection are dependent on the Preserve's acceptance by local community residents as valuable amenities and resources. A belief in open space as a part of their community causes residents and local schools to become interested and protective of the resource. Consequently, residents and local schools not only refrain from disturbing the resource but also inform others of its importance, to prevent vandalism and unauthorized activities from occurring within the open space. In this manner, by becoming stewards of the open space preserve areas, community members provide a valuable service to the Habitat Manager and the preserve, as their vigilance affords protection to the area when the Habitat Manager is not present (Affinis 1998; Helix 2000).

It is the Habitat Manager's responsibility to work with the community as much as

possible and take steps to maintain a positive working relationship between the community and the habitat management program.

- The Habitat Manager shall, when working on-site, answer questions and explain the open space to local residents and students initiating inquiries.

Volunteer services are both a method of and a result of public awareness. Volunteer services, while working within a particular project area, are normally developed at the subregional or regional level. The Habitat Manager shall participate in subregional or regional programs that encourage and feasibly use volunteer services. Continual volunteer programs may be established, allowing students the opportunity to volunteer and aid the Habitat Manager in the maintenance of the open space.

10. Non-Habitat Management Concerns

a. Trash Disposal

Trash and recycling bins shall be placed at the trail entrances. The Habitat Manager shall be responsible for the general cleanliness of the open space, including non-trail areas, by removing any illegal dumping and cleaning up litter. Due to the presence of both historic and prehistoric archaeological artifacts within the open space, coordination with the property's cultural resources manager will be required prior to any trash removal within non-trail/road areas.

The handling, transport, and disposal of any hazardous materials or hazardous wastes found in the open space will be subject to all applicable local, state, and federal regulations. The regulations dictate the qualifications of the personnel and the type of methods and equipment used.

Notification of any toxic spills or unlawful dumping of hazardous wastes in the plan area will be reported to the Habitat Manager.

b. Transient Encampments

Transient encampments are prevalent throughout the undeveloped open space areas of San Diego County. The Habitat Manager shall regularly survey for and report any permanent encampments to the Sheriff's Office. All transient encampments should be removed.

c. Shooting/Hunting

The preservation of habitat is the primary function of the open space reserve. Shooting and hunting are prohibited within the City limits. No shooting or hunting of any kind shall be permitted in the Preserves, and potential hunters shall be advised by signage warning them of the legal consequences of such activity. The Habitat Manager will post this signage as well as inform, in a non-confrontational manner, anyone shooting or hunting within the open space that these activities are illegal or report the activity to the Sheriff's Office, California Department of Fish and Game, or U.S. Fish and Wildlife Service. The Habitat Manager shall report any confrontational situations and any chronic offenders to the aforementioned agencies.

d. Problem Species

The Habitat Manager shall conduct legal removal of any species that becomes a problem due to overpopulation of the species or that is exotic to the preserve. Some species that this might apply to are house cats, brown-headed cowbirds, European starlings, and Argentinean ants. It is the Habitat Manager's responsibility to be sure all necessary approvals and permits from the County, CDFG, and USFWS are obtained before the operations begin.

e. Poaching/Collecting

Removal of any natural resource from the open space—e.g., plants, animals, rocks, minerals—is prohibited. Anyone attempting to take such things shall be informed of the policy by the Habitat Manager, in a non-confrontational manner. Signage will also include language warning of the legal

consequences of removing any natural resources. The Habitat Manager shall report any confrontational situations and any chronic offenders to the appropriate Sheriff's Office.

The Habitat Manager, at his/her discretion, may allow cuttings only for revegetation of areas within the Preserves. Any such cuttings shall be taken only by the Habitat Manager, under his/her supervision, or under a written agreement specifying amounts and localities of collectible materials. These cuttings will be limited to only what is necessary to the revegetation effort and will not seriously deplete the existing vegetation.

f. Utilities Work

It is recognized that ongoing maintenance will occur on the power line access road used to service the existing transmission lines along the western boundary of the Carmel Mountain Preserve and the western portion of Del Mar Mesa Preserve.

g. Lighting

No lighting shall be directed towards the open space areas. Lighting from adjacent developments shall be directed downward, and away from open space.

h. Fencing/Barriers

Permanent fencing preventing human traffic may be placed at appropriate locations on the Preserves to limit the amount of human disturbance to the habitat, and control access as needed. The fencing shall be routinely patrolled to monitor for signs of trespassing, specifically around the vernal pools. Permanent or temporary fencing that does not inhibit the movement of wildlife may be installed along or adjacent to power transmission line access roads within the open space.

At the hiking and equestrian trailheads, barrier posts will be placed in the trail to prevent motorized vehicles from entering the trail while allowing hikers and horses to pass through. The Habitat Manager shall also coordinate with SDG&E to have a gate

placed at each entrance to the SDG&E access roads.

11. New Development

The following guidelines pertain to new development on and adjacent to the Preserves:

1. Applicable city, state, or federal permits shall be required prior to beginning a development activity. Additionally, all such activity will comply with guidelines in this management plan. City of San Diego review of the project is also required to ensure that the project is in conformance with the Land Development Code and the guidelines adopted in this management plan are being incorporated. Affected landowners within the preserves should be contacted prior to any development activities. Any additional regulatory requirements should be implemented as required by the affected land owners (e.g., U.S. Fish and Wildlife Service Refuge requirements).
2. All developed areas in and adjacent to the preserves shall not drain directly into the preserves. All developed and paved areas shall prevent the release of toxins, chemical, petroleum products, fertilizers, exotic plant material, and other elements that might degrade or harm the natural environment within the preserves. Methods for pollutant runoff control, such as natural retention basins, grass swales, or mechanical trapping devices, should be maintained as needed to ensure proper function. Appropriate maintenance could include dredging of sediments, removing exotic plants, or adding chemical-neutralizing compounds.
3. Development, construction, or maintenance design or activities should avoid concentrating runoff into the preserves.
4. All new development adjacent to the preserves should provide a buffer or setback outside the Preserves sufficient to accommodate MSCP and brush management requirements, including mitigation for such activities if required.
5. Adjacent development should provide a fence or vegetative barrier along the edge effect within their brush management zone, except at an approved trailhead location.
6. Developer should consult with City of San Diego to identify the specific trailhead location(s) in order to ensure the trailhead and connecting trail locations are sited away from sensitive plants, sensitive habitats, sensitive breeding areas, and cultural resources. The design of the trailhead and trail should also be subject to approval by the City of San Diego and any affected landowner.
7. Development of new trails requires City of San Diego environmental review per state law (CEQA).
8. The trail system should be sited within or adjacent to existing access roads whenever possible to consolidate use.
9. Trail width should be minimized, wherever possible, consistent with the type of use on that trail and trail location.
10. New trails should be planned on north-facing slopes in chaparral, away from the coastal sage scrub habitat of the threatened gnatcatcher, which is usually found on south-facing slopes, and all other sensitive habitat.
11. Any construction, including trails, resulting in subsurface disturbance should be monitored by a Native American consultant or qualified archaeologist for impacts to prehistoric and historic resources. (See Guideline No. 3 under Preserve Maintenance.)
12. The design of new or rehabilitation of existing trails should avoid or minimize potential impacts to the greatest extent possible. Impacts should be determined through biological and cultural resource assessment survey.
13. Trails from areas adjacent to preserves should be limited in number. Possible locations are given in Chapter 5 of this document. Installation of any new trails

- should be studied in advance to avoid sensitive habitats and archaeological sites and minimize erosion, while allowing for reasonable public use.
14. Siting of trails should not follow ecotones (edges between plant communities) but should be limited, if possible, to a single trail that winds through each plant community and crosses ecotone boundaries. This optimizes interpretive and recreational value while protecting the multiple species that often congregate in ecotonal areas.
 15. Trails should be relocated to avoid/protect endangered or sensitive plant species (including all MSCP covered species), key wildlife breeding habitats, and archaeology sites with surface artifacts.
 16. Maintenance roads, footpaths, and equestrian and bicycling trails in the preserves should be unpaved. Alternative trail and access road surfaces may be considered for erosion control. Possible alternatives include gravel; fiber matting, polymer-based compounds; mulching with organic or non-organic materials; and other measures, such as logs diagonally crossing the trail, should be used to control erosion. A concrete-treated base may be desirable in some locations for stability but should not be used unless absolutely necessary. Paved areas within the preserves should be kept to a minimum to avoid water quality, hydrology, and aesthetic impacts.
 17. Erosion of trails should be limited by following the guidelines given in Chapter 5 of this document.
 18. Buffer zones serve a biological function by providing a separation and screening of wildlife habitat from human activity associated with human development. The size/width of the buffer shall be based on site-specific biological resource information. Land use within buffer areas will be limited to bikeways, walkways, and passive recreation, such as nature study, viewing, and picnicking. Buffer areas should be planted with appropriate vegetation native to southern California and compatible with the adjacent habitat. Measures should be taken to keep runoff from entering preserves.
 19. The only exceptions to buffer zone provisions are signs, boundary fences, and educational or research-oriented structures with City approval on a project-by-project basis. City approval will include environmental review.
 20. If barriers are needed, preference should be given to using a rustic style, such as split rail or post and rail fencing, or natural barrier plantings, such as wild rose (*Rosa californica*), blackberry (*Rubus ursinus*), cactus (*Opuntia* sp.), or logs from fallen trees.
 21. Any lighting needed for public safety in the preserves or adjacent to the preserves should be hooded, directional, low intensity sodium vapor lights, especially near biological buffers. Placement of lighting should consider the sensitivity of adjacent biological resources.
 22. Concentrate noise activities away from habitats where sensitive animal species occur or are likely to occur. These areas are variable depending on seasonal requirements of biological resources in the area.
 23. Where noise associated with clearing, grading, mining, or grubbing would negatively impact, as determined by City's biologist, an occupied nest for raptors during December 1 to May 31 or for California gnatcatcher during March 1 to August 15, clearing, grading, mining, or grubbing activities shall be modified if necessary to prevent noise from negatively impacting the breeding success of the pair. If an occupied raptor or California gnatcatcher nest is identified in a pre-construction survey, noise reduction techniques shall be incorporated into the construction plan.
 24. Outside the bird breeding season(s) no restriction shall be placed on temporary construction noise.

25. Berms or walls should be constructed adjacent commercial areas, recreational areas, and any other use that may introduce noises that could impact or interfere with wildlife utilization of the preserves. Excessively noisy uses or activities adjacent to breeding areas should incorporate noise reduction measures and be curtailed during the breeding season of sensitive species. Adequate noise reduction measures should also be incorporated for the remainder of the year.
26. The landscape plant palette for any development within or adjacent to the preserves should not include any invasive exotic species.
27. Any proposed equestrian staging areas should be sited sufficient distance (i.e., 300-500 feet) from riparian or coastal sage scrub habitat.
28. The permanent storage of materials, hazardous material, or equipment shall be prohibited from occurring within the preserves. Any such storage of similar materials and equipment adjacent to the preserves should follow all applicable regulations to ensure that toxic or polluting materials do not enter the preserves.
- habitat be undisturbed and high quality. Some adjacent lands may require enhancement before they would be acceptable as mitigation for development impacts.

E. Mitigation Options and Guidelines

Pardee Construction Company, through an agreement with the City of San Diego as part of the dedication of lands from Pardee to the City, has the right to sell 24 acres of habitat at the Carmel Mountain Preserve to another party as mitigation for development impacts. The 24 acres is not specific to any location on the ground, but is a means for Pardee to recoup some of the cost of dedicating the land. The acres can be sold in part or as a whole, at a per acre cost agreed upon between the City and Pardee. Other mitigation options are in the purchase of private lands adjacent to the Preserve and dedication of the land to the Preserve. Dedication of the land would require that the